

Panaji, 1st March, 2024 (Phalguna 11, 1945)

**SERIES I No. 48**

# OFFICIAL GAZETTE GOVERNMENT OF GOA

PUBLISHED BY AUTHORITY

## SUPPLEMENT

GOVERNMENT OF GOA

Department of Urban Development

Municipal Administration

### Notification

10/661/2015/DMA/NGT/VOL. III/PART FILE/3306

A Policy namely a Revised Solid Waste Management Policy for the State of Goa is formulated based on National Solid Waste Management Policy and National Urban Sanitation Policy as required under clause (c) of sub-rule (1) of rule 6 of the Solid Waste Management Rules, 2016 and the provisions under clause (a), (b) & (c) of sub-rule (1) of rule 11 of the Solid Waste Management Rules, 2016.

The Government of Goa is pleased to frame the Policy to give a major impetus to waste prevention/reduction, reuse, recovery, recycling, improve the infrastructure for Waste Management and to provide assistance to the Local Bodies and other Authorized Agencies within the State, for discharging their functions in a more effective, efficient and sustainable manner, with an appeal to the citizens of Goa to do their part by abiding with the existing regulations and cooperate with the local bodies in their effort to improve waste management in their jurisdiction.

By order and in the name of the Governor of Goa.

*Gurudas P. Pilarnekar*, Director (Urban Development) & ex officio Additional Secretary.

Panaji, 31st January, 2024.

## **Revised Policy—Solid Waste Management Policy for the State of Goa**

### **Abbreviations**

CCP	: Corporation of the City of Panaji
C&D Waste	: Construction and Demolition Waste
CBWTF	: Common Biomedical Waste Treatment Facility
CLIF	: Cluster Level Integrated Facility
EPR	: Extended Producer Responsibility
GWMC	: Goa Waste Management Corporation
GSPCB	: Goa State Pollution Control Board
HDPE	: High Density Polyethylene
ICT	: Information and Communication Technology
IEC	: Information, Education and Communication
LCV	: Light Commercial Vehicle
MLP	: Multi-layer Plastics
MRF	: Material Recovery Facility
MSW	: Municipal Solid Waste
OWC	: Organic Waste Convertor
RCV	: Refuse Compactor Vehicles
RDF	: Refuse Derived Fuel
RWA	: Resident Welfare Association
TPD	: Tonnes Per Day
TSDF	: Treatment Storage & Disposal Facility
ULB	: Urban Local Body
VP	: Village Panchayat

### **Glossary**

1. “Agency/Contractor/Service Provider” means any person (or) an entity hired/engaged by the local body for sweeping of streets/footpaths, collection and transportation of waste, segregation and disposal of waste.

2. “Applicable Acts and Rules” means the Environment Protection Act, 1986; Goa Municipality Act, 1968; Solid Waste Management Rules, 2016; The Goa Non-biodegradable Garbage (Control) Act, 1996; The Goa Non-biodegradable Garbage (Control) Rules, 1997; Plastic Waste Management Rules, 2016; Model Goa MSW (Management & Handling) Bye-Laws, 2020; Model Goa Municipal Plastic Waste Management Bye-Laws, 2022; E-Waste Management Rules, 2016; the Construction and Demolition Waste Management Rules, 2016 and the Bio-Medical Waste Management Rules, 2016, as amended from time to time, and any other relevant Act and rules, bye-laws framed thereunder.

3. "Blackspots" are unauthorized areas where garbage is dumped on a regular basis, largely by locals.
4. "Bio-Degradable Waste/Wet Waste" means kitchen waste, food waste, leaf litter and any other material that gets degraded/decomposed by the action of micro-organisms.
5. "Bio-Medical Waste" means any waste, which is generated during the diagnosis, treatment or immunization of human beings or animals or in research activities pertaining to testing of biological materials or in health camps.
6. "Bulk Waste of Garden and Horticulture" means bulk solid waste from parks, gardens, traffic islands, road medians etc., including grass and wood clippings, weeds, woody 'brown' carbon-rich material, such as tree pruning, branches, twigs, wood chipping, straw or dead leaves and tree trimmings, which cannot be accommodated in daily door to door collection system for bio-degradable waste.
7. "Bulk Waste Generator" means any generator having an average wet waste generation rate exceeding 25 kilograms per day or 1000 kilograms of garden or horticulture waste per month which includes owner and occupier of house/flat, housing society, hotel, market, industrial estate, shopping complex/mall, private company, hospital, educational institutions, commercial establishment, place of worship, sports complex, club, gymkhana, marriage hall, recreation/entertainment complex, etc.
8. "Composting" means a controlled process involving microbial decomposition/breaking down of organic matter including vermi composting for conversion of biodegradable waste into compost;
9. "Construction and Demolition Waste" means a waste of building materials, debris and rubble resulting from construction, remodeling, renovation, repair and demolition operations which includes materials such as concrete, cement, mortar (grout/putty) bricks, wood, asphalt (from roads), roofing (laterite clay), glass, ceramic, plaster of paris, plastic, metals and other related waste.
10. "Corporate Social Responsibility" means practices or policies undertaken by corporations intend to have a positive social, environmental and economic influence.
11. "Domestic Hazardous Waste" means any chemical or product that can cause serious illness or pose an environmental or health threat if improperly stored, transported or disposed as detailed in Schedule II of the SWM Bye-Laws.
12. "Event" means a planned and authorized public or social occasion happening at a defined time and place, e.g. fairs, health camps, exhibitions, entertainment programs, etc.
13. "Extended Producer Responsibility" means responsibility imposed upon manufactures or producers or brand owners towards collection, processing and disposal for environmentally sound management of their post-consumer-use or end-of-life products.
14. "Generator of Waste" means a generator of solid waste and includes person or establishment or any premise which is generating or caused to generate solid waste within the limits of Council.
15. "Landfill" means a scientifically engineered waste disposal site used for the deposit of residual inert solid waste in a facility designed with protective measures against pollution of air, water, odour, fire hazard, bird menace, pests or rodents, greenhouse gas emissions, erosion etc.

16. "Litter" consists of any refuse or waste material that has been disposed of indiscriminately, which tends to create nuisance, unsanitary conditions, public disorderliness and endangers environment, public health, safety and life.

17. "Local Body" is an institution of local self governance, which look after the administration of an area or small community such as villages, towns, or cities. The local bodies in India are broadly classified into two categories. The local bodies constituted for local planning, development and administration in the rural areas are referred as Rural Local Bodies (Panchayats) and the local bodies, which are constituted for local planning, development and administration in the urban areas are referred as Urban Local Bodies (Municipalities).

18. "Material Recovery Facility" is a facility which receives mixed solid waste and uses a combination of equipment and manual labour to separate and densify materials in preparation for shipment downstream to recyclers of the particular recovered materials.

19. "Municipal Solid Waste" means and includes solid or semi-solid domestic waste, sanitary waste, commercial waste, institutional waste, catering and market waste and other non-residential wastes, street sweepings, silt removed or collected from the surface drains, horticulture waste, agriculture and dairy waste.

20. "Nuisance Detectors" means and includes the Chief Officers, Municipal Engineers, Sanitary Inspectors, Municipal Inspectors or any other person empowered by the local body to enforce the provisions of Bye-laws or to detect acts of public nuisance.

21. "Public Place" means any place which is open to the use and enjoyment of the public, whether it is actually used or enjoyed by the public or not.

22. "Recycling" is the process of converting waste materials into new materials and objects either for the original use or for any other purpose.

23. "Refuse Derived Fuel" is fuel produced from the combustible components of Municipal Solid Waste, generally after sorting the recyclable fractions.

24. "Resource Recovery" is using waste as an input material to either create valuable products as new outputs or for energy recovery as an alternative to fossil fuels.

25. "Sanitary Waste" means wastes comprising of used diapers, sanitary towels or napkins, tampons, condoms, incontinence sheets and any other similar waste.

26. "Solid Waste Management" refers to the collection, segregation, treatment and disposal of solid material that is discarded because it has served its purpose or is no longer useful.

27. Treated biomedical waste excluding industrial waste, bio-medical waste and e-waste, battery waste, radio-active waste generated within the local limits of the Council.

28. "Street Vendor" means any authorized person engaged in vending of articles, goods, wares, food items or services to the general public in a street, lane, side walk, footpath, pavement, or any other public place or private area, from a temporary built up structure or by moving from place to place.

29. "Transfer Station" means any facility where solid waste is unloaded from collection vehicles or containers for reloading into larger, long-distance vehicles for transport to sorting or treatment facilities or landfills.

30. "Waste Picker" means an authorized, trained person or groups of persons informally engaged in collection and recovery of reusable and recyclable solid waste from the source of waste generation, streets, bins, material recovery facilities, processing and waste disposal facilities for sale to recyclers directly or through intermediaries to earn their livelihood.

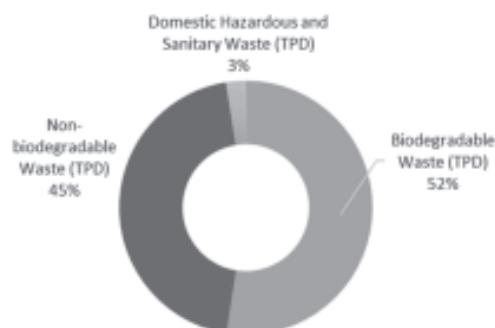
## Introduction

Renowned for its beaches, places of worship and world heritage architecture, Goa is visited by large number of international and domestic tourists each year. With a resident population of around fifteen lakhs and a floating population of over 80 lakhs per annum (in the year 2019)<sup>1</sup>, efficient and effective Solid Waste Management (SWM) is one of the key challenges being faced by the State.

While Goa already has a waste management system in place, following are the limitations and gaps in the existing system and infrastructure across the State;

- » Goa has space constraints to carry out appropriate SWM which is primarily attributed to the linear shape of the State, in addition to the existence of water bodies and wetlands, zones that falls under the Coastal Regulation Zone (CRZ) area and the ecologically sensitive Western Ghats.
- » Increased time and cost involved for transportation of solid waste over long distances owing to inadequate sorting and storage infrastructure.
- » At present, only two solid waste processing plants are in operation – one of 250 TPD at Saligao, North Goa and the other of 100 TPD at Cacora, South Goa. Two more facilities - one in the South at Verna (250 TPD + 250 TPD Energy Recovery Facility) and one at Bainguinim (100 TPD) in the North are proposed to be set-up.
- » There is scarcity of land to set up full-fledged village panchayat level solid waste processing facilities, especially in high density coastal panchayats. In case of land availability, objections from locals often derail the process, commonly referred to as Not in my Backyard (NIMBY) syndrome.
- » Inadequate D2D Collection of bio-degradable (also referred to as 'wet waste') and non-bio-degradable waste (also referred to as 'dry waste'), leading to unauthorized dumping and mushrooming of Blackspots.
- » High costs are being incurred for transportation of solid waste from the local bodies to the integrated solid waste processing facility and subsequently the non-recyclable waste to the cement factories in Karnataka.

As per a detailed survey conducted in 2018, the total solid waste generated in the State of Goa was 766 TPD of which 52% was bio-degradable waste, 45% non-bio-degradable waste and the balance, domestic hazardous and sanitary waste.



**Figure 1: Physical composition of waste for the State of Goa**

Source: Primary Survey

<sup>1</sup>As per [www.goatourism.gov.in](http://www.goatourism.gov.in)

Of the total solid waste, 61% was generated by the households, 35% was from commercial establishments and another 4% was generated from street sweeping activities. The average per capita solid waste in the State was 484 grams per day (gmpd) whereas the per capita generation in north Goa and in south Goa was 530 gmpd and 427 gmpd respectively. Over time, the per-capita generation is likely to increase as the standard of living improves.

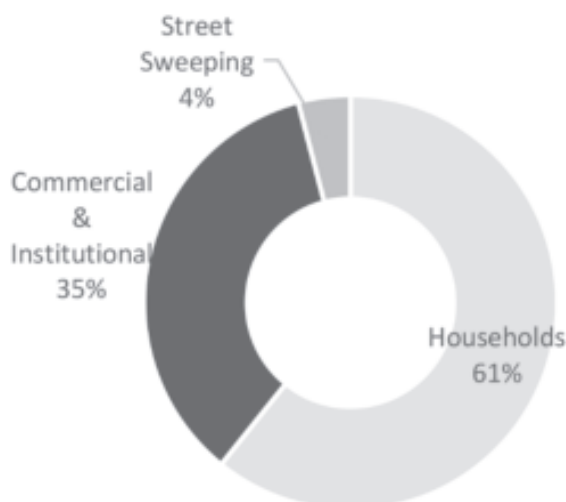


Figure 2:

ate of Goa

Source: Primary Survey

Pursuant to the Solid Waste Management Rules, 2016, the Government of Goa felt it necessary to put in place a policy for SWM. The Government had therefore in October 2018 notified a waste management policy. However, given the dynamic ecosystem of SWM, the **Revised Solid Waste Management Policy (SWMP) 2022 – 2037** (hereinafter referred to as the “Policy”) shall be drafted as a guiding document promoting the objectives and efforts of the Government of Goa in the domain of SWM.

*The Policy aims to provide a coherent, comprehensive, dynamic and useful framework for SWM, for the period 2022-2037.*

### Scope & Applicability

The scope of the Policy is limited to the management of waste (wet, dry, domestic hazardous and sanitary waste) generated from households, commercial establishments, institutions etc., and does not cover under its ambit the management of other types of wastes such as bio-medical, hazardous, electronic, construction and demolition etc.

The Policy applies to all waste generators and local bodies in the State of Goa and encompasses generation, segregation, storage, collection, transportation, treatment and disposal of solid waste within the State. Revised SWMP, 2022-2037 shall be valid for a period of fifteen years



Figure 3: Scope of Revised SWMP, 2022-2037



Owing to the continuous advancement in technology and practices, the Policy shall be periodically reviewed by the concerned authority at the end of each 5 year period so as to assess progress made and recommend course corrections, if required

The Policy is an effort made towards strengthening and improving the prevailing Solid Waste Management Policy that was notified by the Government of Goa on 11 October, 2018.

### Vision

*As a State endowed with nature's bounty and rich heritage, Goa will be a leader in environment safeguarding through informed, responsible, accountable and proactive citizens, visitors and the Government who shall, together bring in efficient, effective and sustainable municipal solid waste management that would steer towards achieving 'Zero Waste Goa'*

The term 'zero waste' refers to adopting a set of principles focused on waste prevention; it promotes more sustainable consumer choices and are design of resource life cycles that result in products being reused and recycled; with the ultimate objective of minimising disposal to landfills.

Sustainable waste management and realisation of zero waste, both can be achieved only when it is backed by presence of adequate infrastructure facilities and a strong conviction from the State, communities and citizens to support it.

Development of infrastructure and provision of services are primarily the prerogative of the Government. However a successful implementation of the system is dependent on a proactive involvement and contribution by all waste generators, including communities and citizens.

### Guiding Principles

1. Adopt the principle of waste hierarchy that leads a transition from linear to circular economy approach.

The aim of moving towards a circular economy means moving up in the hierarchy, away from open dumping and engineered land filling to more and more recycling. To give consideration to both, environmental impacts and the life-cycle of resource is at the core of this waste management concept.

**Source Reduction:** The State shall take measures to impose bans or curbs on production and use of certain single use plastics. Awareness activities shall also be carried out using all possible means either directly or through the engagement of the private sector.

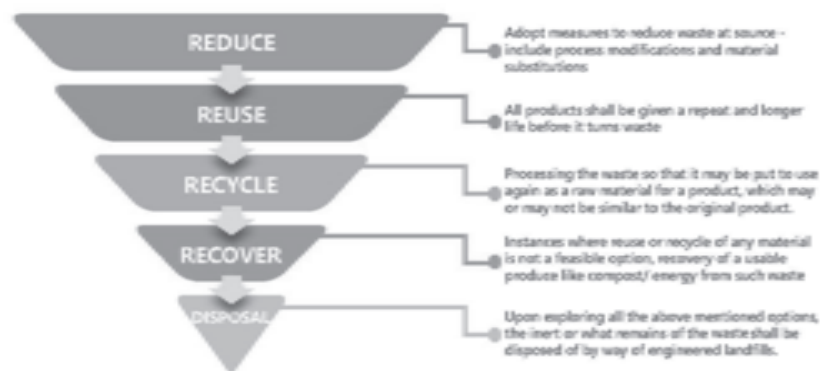
**Reuse:** The State shall encourage citizens to reuse products to the greatest extent and only dispose after the intended end-of-life of the product. This shall be achieved by incentivising availability and production of reusable items and discouraging single-use materials. The State shall also support R&D initiatives for products meeting the above objectives.

**Segregation:** The key to maximizing recyclability and resource recovery is segregation. Segregation into the desired fractions shall be mandated and violators punished in case of default. This shall be a critical aspect of the IEC and awareness activities conducted through the State. Waste handlers or *safai karamcharis* shall be suitably trained on identifying the various recyclable fractions in the waste stream for improved recycling efficiency.

**Recycling:** A conscious and proactive attempt shall be made to maximize the recycling potential for fractions in the waste stream such as metals, glass, plastic, paper, fibre, etc. This shall be possible through improved door-to-door waste collection, setting-up of decentralized MRFs wherever feasible and better utilization of technology. Private sector participation, capacity building of the informal sector and active involvement of brands under EPR will be encouraged to ensure that the desired recycling objectives are met. In addition, the Government will also encourage and support R&D initiatives in developing improved and efficient recycling technologies.

**Resource Recovery:** In cases where reuse or recycle of any material is not a feasible option, resource recovery from waste through production of compost or waste-to-energy generation shall be explored thereby reducing the volume of waste to be disposed through land filling.

**Residual Management:** Upon exploring all the above mentioned options, the inert fraction or what remains of the solid waste shall be disposed-off by way of engineered landfills.



## 2. Adopt a decentralised approach to SWM

The state of Goa has varied geo-morphological features that include coastal tracts with beaches, estuarine khazan lands, sub-ghat hinterland regions which consist mainly of plains with undulating rolling terrain and the Western Ghat regions with high mountains with eco-sensitive zones.

Accordingly, the settlement pattern and the population density in the State is also varied. The coastal tracts are mostly densely populated with the sub-ghat plains moderately populated with high density in some areas. Given the above, there is also a marked difference in the per capita per day quantum as well as the relative composition of solid waste generation in different regions of the State.

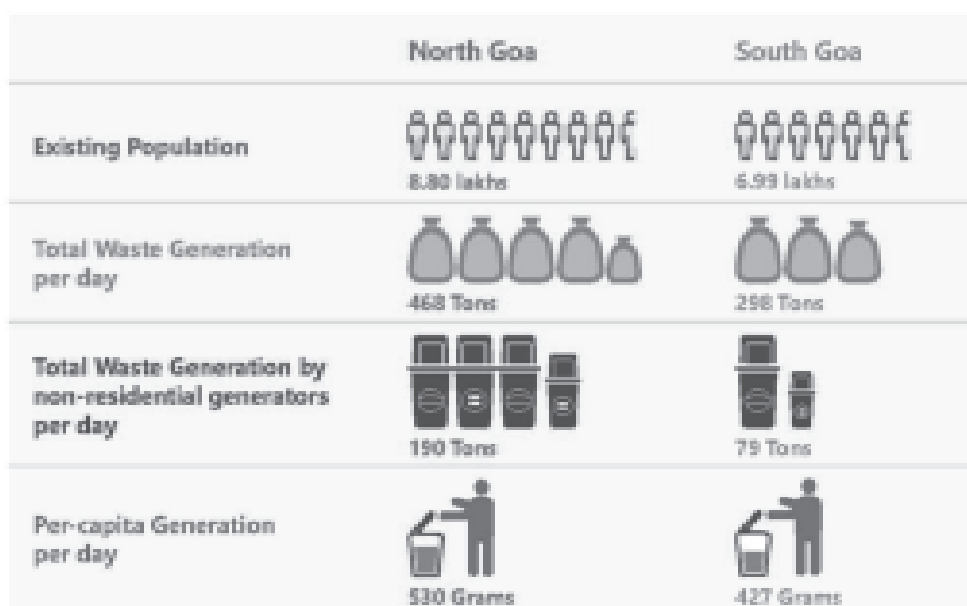
It is therefore necessary to adopt an approach best suited to the local setting and waste quantum generated.

Table 1: Solid waste Generation Quantity in the State & Districts

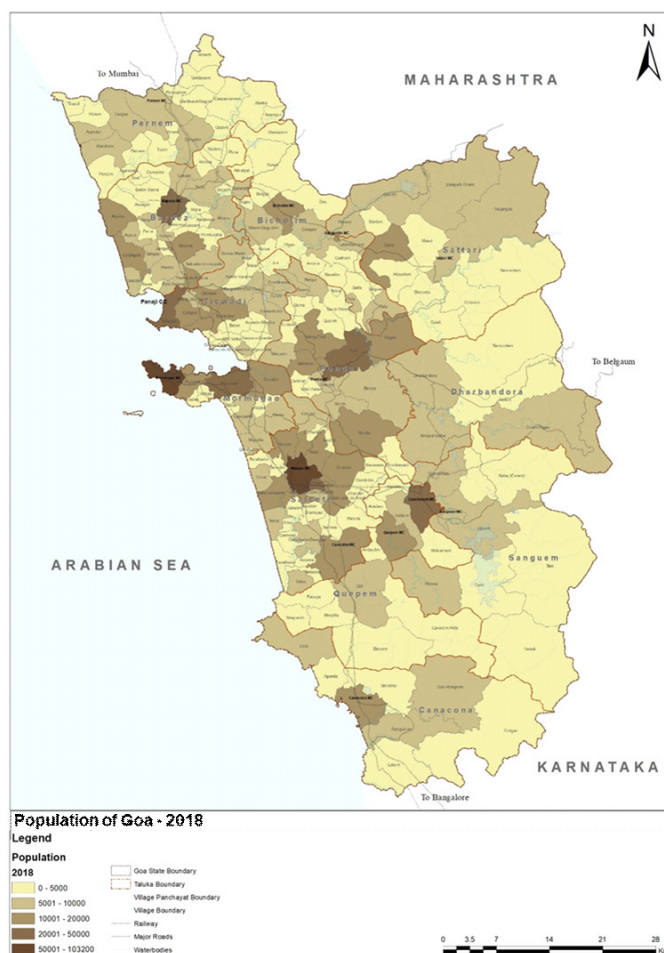
S. No.	Particulars	Unit	Estimated Solid Waste Generation (2018)		
			State	North Goa District	South Goa District
1	Population	Nos.	15,80,507	880,995	699,553
2	Total Quantum of Waste Generated	TPD	765.64	468.28	298.38
2a	Residential (HHs)	TPD	465.23	261.11	204.11
2b	Non-residential (Commercial and Institutional)	TPD	269.16	190.16	79.00
2c	Street Sweeping	TPD	31.26	15.99	15.27
3	Per Capita Generation Per Day	Kg/day	0.484	0.530	0.427

Source: Primary Survey Analysis

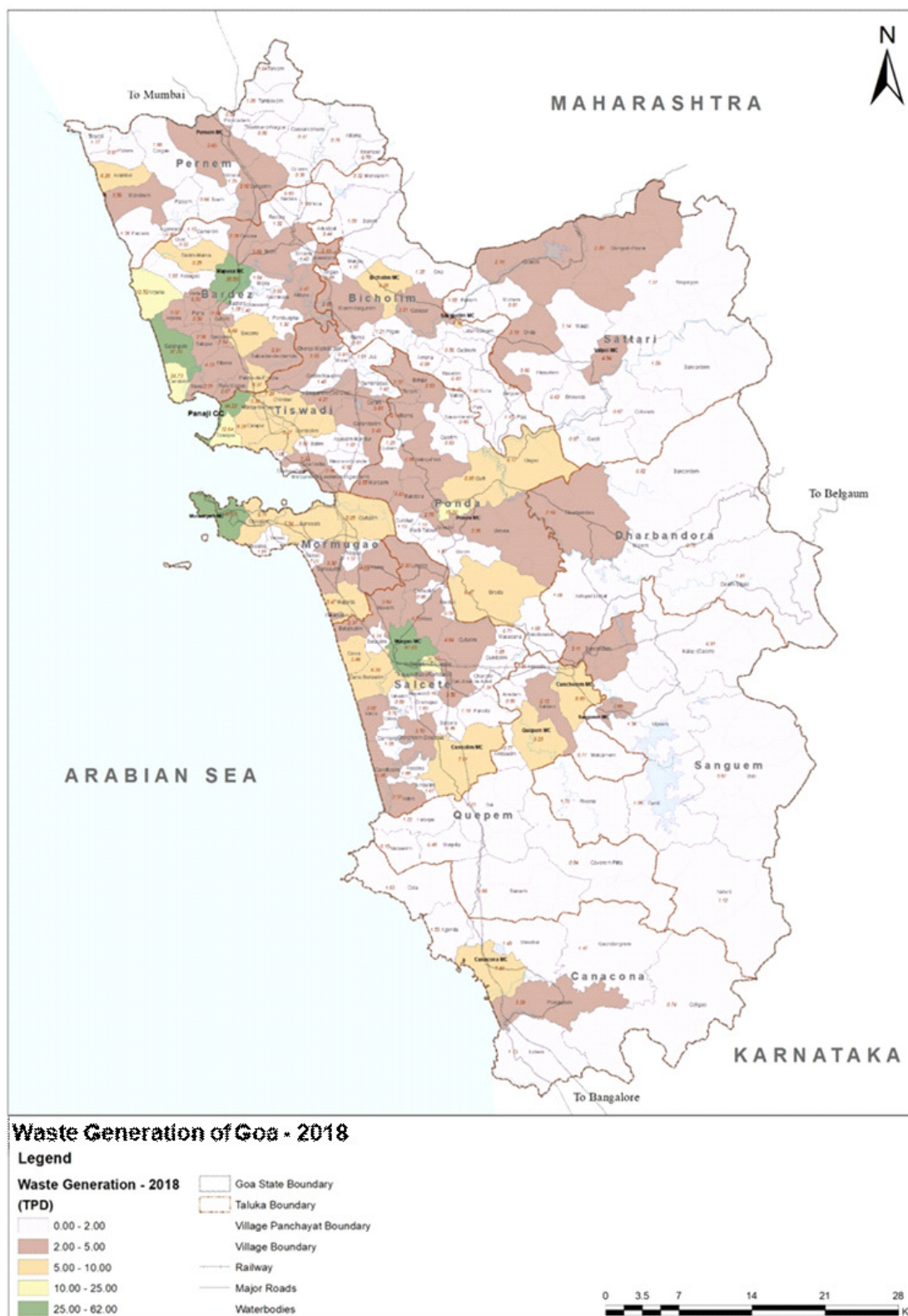




**Figure 4: Waste generation numbers from the primary survey**



**Figure 5: Map showing population variation in Goa**



**Figure 6: Map showing variation in waste generation volumes in Goa**

For purposes of implementation of SWM, the Policy recommends re-organising the State of Goa into four clusters viz. Saligao (Bicholim as a sub-cluster), Baiguinim, Cacora and Verna clusters. The details of clusters are set out as **Appendix A** of this Policy.



**Figure 7: Map showing proposed waste management clusters in Goa**

The waste management systems also have to be designed to suit the onsite conditions and shall be carried out at different levels

- » Generator level
- » Local body level
- » 'Cluster' level
- » Regional level

Individual households as well as bulk waste generators shall be encouraged to manage or treat the wet waste within their premises. Alternatively, segregated waste may also be disposed directly to authorized collectors/recyclers or other sources.

All local bodies, especially in urban areas or areas with urban character where large quantities are generated, shall strive to set up MRFs or waste sorting stations. Dry waste shall be sorted

into recyclable fractions which may be sold to authorized agencies and non-recyclable RDF shall be periodically sent to cement companies for co-processing, waste to energy plants or disposed of using any other approved means. Wet waste shall be processed by way of windrow composting, small-scale biogas plants, drum composting, organic waste converters (OWC's) or biomethanation plants or through Black Soldier Fly Larvae (BSF). Alternatively, collected segregated waste may be directly transported to the Cluster Level Integrated Facility (CLIF) for further treatment in case of local bodies being within a radius of 10 kms from the CLIF.

Each cluster shall have integrated facilities comprising dry waste resource recovery centres and bio-degradable waste processing facilities. They shall strive to maximize the recycling and resource recovery potential of the incoming waste through appropriate mechanization, use of technology and training of manpower.

The diagram given below sets out the proposed waste management strategy at every level;

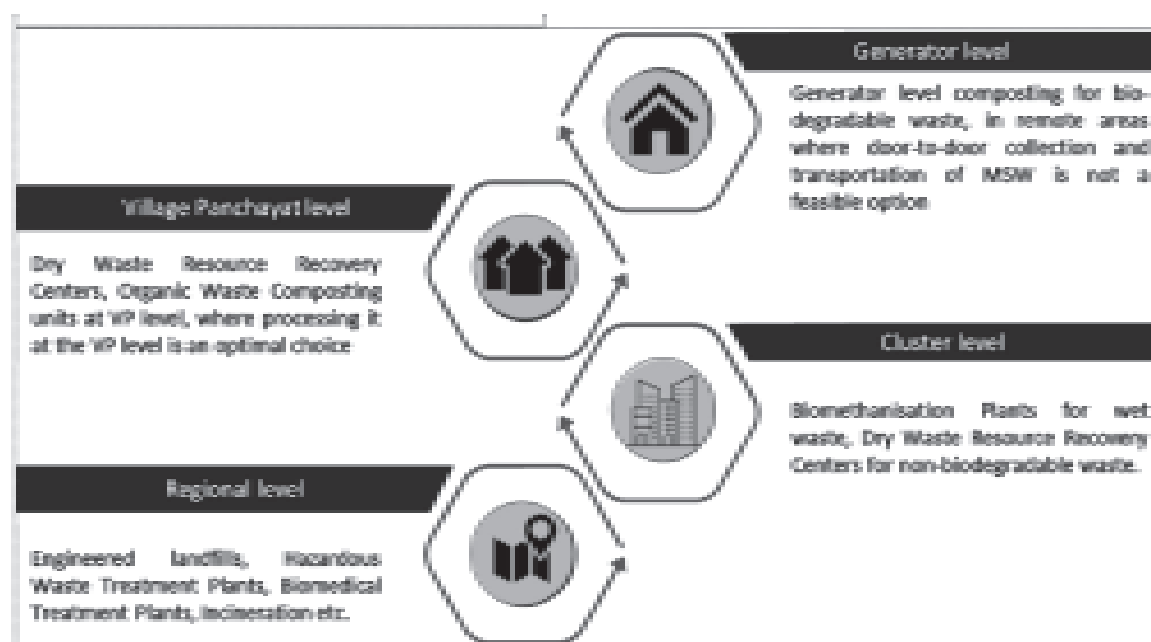


Figure 8: Proposed Waste Management Strategy

All other types of waste shall be transported by the local bodies/CLIF's to its respective processing facility at the regional level for treatment and disposal. Alternatively, pick up by the regional facility may also be arranged based on applicable rates.

### 3. Integrate Information, Communication and Technology (ICT) in SWM

On setting up of waste management systems across the State, ICT interventions will be directed towards improving the day to day operations of the SWM activities. The various ICT interventions at all levels across the SWM value chain – collection, transportation, processing and disposal will be integrated with the implementation strategy.

In order to ensure efficiency in operationalizing the proposed SWM system and effectively monitor local body level operations on a day to day basis, there is a need to automate the entire process through installation of edge devices and setting up of command and control centres for collection and management of data, alerts for deviations and non-performance, real-time monitoring, grievance redressal and the like.



An advanced “eSWM solution” shall be developed using the latest web and mobile based technologies in a manner that is quickly implementable, easily configurable, modular, scalable, and flexible.

#### **4. Strengthen the institutional framework for SWM.**

The Policy proposes setting up of a strong, reliable and efficient legal and institutional framework to implement the recommendations under this Policy.

The legal and institutional framework shall define the roles and responsibilities of various agencies and departments to ensure that SWM systems are in tune with the technological advancements and the adopted best practices and the Policy is implemented to the letter and spirit. The SWM Bye-Laws of 2020 and its subsequent amendments shall be the guiding document defining this legal and institutional framework.

The local bodies shall be primarily responsible for SWM. GSUDA and GWMC shall be the implementing agencies for urban and rural areas respectively with GWMC also being the technical agency through which setting up of regional level facilities for managing all streams of waste governed by Rules shall be undertaken.

#### **5. Inclusion of Information, Education and Communication (IEC) in creating thoughtful citizens, communities and society**

The IEC program shall be carried out in tandem with public, all the concerned State level departments, and other important stakeholders.

The key focus areas shall include the following;

- » Stakeholder's perceptions about the issues,
- » Present attitude towards self-regulating their garbage,
- » Expectation on assistance,
- » Intervention and services from the State in this area.

Based on these interactions, the IEC activities and campaigning strategy will be worked out. This shall include assessing present public awareness levels in the State on waste segregation and waste management, identifying key audience segments, through a judicious mix of technology enabled as well as traditional communication. Schools shall be the prime focus as the children are the future citizens.

Local bodies either directly or through authorized agencies shall undertake awareness using various available mediums. Brand Owners, Manufacturers and Producers shall also be roped in to undertake sensitization and awareness at public places on waste minimization and management.

The State Government shall collaborate/partner with national and international agencies for undertaking waste related awareness and for implementation of waste management strategies across the State.

#### **SWM Strategy**

##### **1. Implement Reduce, Reuse, Recover and Recycle Practices in SWM**

##### **Source Reduction – Waste Minimization**

Waste minimisation is the most preferred tier in the waste management hierarchy, as it directly results in significant reduction in environmental and financial costs. The minimisation strategy requires policy intervention as well as community level initiatives to bring about a behavioural change.

- a. The State, in line with the policies of the Government of India, shall impose a ban on the use of select single-use plastic and carry bags of specified quality.
- b. The State through the GSPCB or any other authorized agency shall crack down on unauthorized manufactures and distributors of packaging products banned under the applicable Acts and Rules.
- c. The Government shall facilitate the organization of regular awareness programmes with the aim of bringing about a behavioural change in citizens.
- d. The State shall formulate guidelines for packaging material and duly notify in the Gazette, items/materials that shall be restricted from use for packaging.
- e. Use of select plastic and packaging items shall be phased out subject to availability of sustainable alternatives.
- f. The State shall undertake initiatives promoting the use of non-plastic, re-usable bags made of cloth, jute, etc. Larger production and distribution of such reusable and sustainable items shall be supported and encouraged.
- g. Retail outlets shall be discouraged to use plastic carry bags.
- h. The State shall introduce guidelines (Green Protocol) to be adopted in organising of events so as to reduce waste generation.

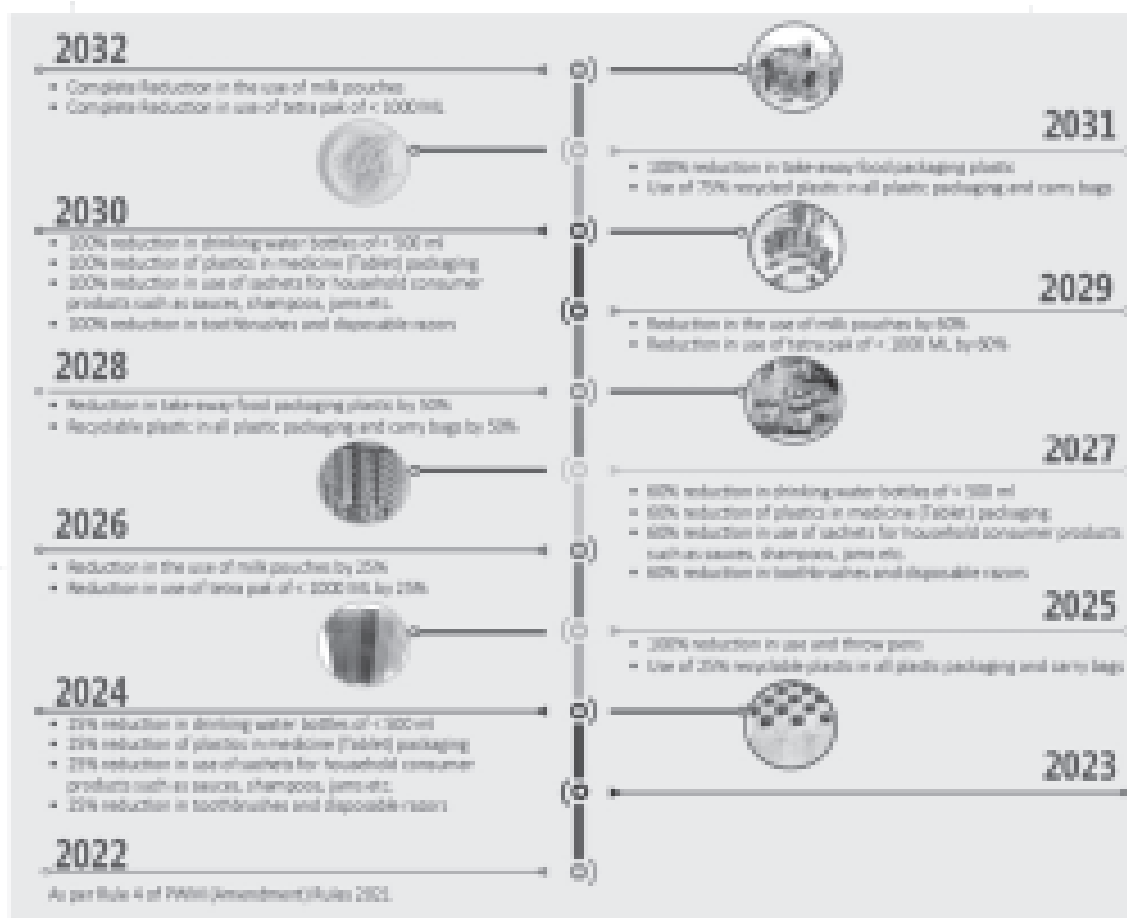
**Segregation at source:**

- a. The Goa Non-Biodegradable Garbage (Control) Act, 1996 has been amended and the Model MSW Bye-Laws, 2020 developed to make segregation at source compulsory with provisions made to penalize offenders.
- b. Households shall be required to segregate their waste into five fractions viz. bio-degradable (Green), non-bio-degradable-recyclable (Blue), non-bio-degradable-non-recyclable (White), sanitary waste (Purple) and domestic hazardous wastes (Red), as defined in the Model SWM Bye-Laws
- c. The bulk generators shall segregate waste into categories specified in the SWM Bye-Laws or as specified by the local body and strive to manage disposal of waste generated within their premises. In addition, bulk garden/horticulture trimmings (Brown) and C & D Waste (Grey) shall also be stored separately for collection as per the procedure specified by the local body.



*Figure 9: Colour-coded MSW segregation categories*





**Figure 10: Proposed Waste Reduction Targets**

d. Small commercial establishments and street vendors shall also be required to segregate and store their waste into a minimum of dry and wet fractions.

e. Households shall be instructed to use bins for storing segregated waste. Use of new plastic bags for waste collection shall be discouraged.

f. Bio-degradable waste may be stored in bins lined with paper or compostable plastic bags for ease of disposal. In case of unavailability of biodegradable bags, old used plastic bags may be used to collect items like fish or meat waste.

g. A litter bin policy shall be adopted by the Government for installation of colour-coded, street side bins that facilitate segregation of wastes at high density areas such as beaches, markets and commercial streets.

h. Arrangements must be made for storage of segregated highway cleaning waste to be picked up by the contractor.

## Reuse, Recover & Recycle

### I. Local Bodies shall

a. Adopt the principle of “pay as you throw” by levying user charges specified in the SMW Bye-Laws for various generators.

b. Facilitate buy back schemes/programmes at retail stores and supermarkets for recyclable as well as non-recyclable items.

c. Strive to set up conveniently located collection centres or drop of points for various waste fractions.

d. Explore the option of private sector participation for operating waste management systems.

e. Strive to maximize the recycling potential of the incoming dry waste stream and reduce recyclables in the RDF.

f. Undertake regular training of Safai Karamcharis on segregation and health and safety practices.

II. The Government through the Department of Environment shall introduce guidelines for the adoption of eco-labelling standards for product packaging of consumables.

III. Guidelines shall be established for registration and/or formalization of all levels of the informal sector (waste pickers, scrap dealers, aggregators etc.).

IV. An EPR Policy shall be developed by the State clearly defining processes, scope and responsibilities of all stakeholders to enable best use of EPR funds from brands and producers towards fulfilling the objectives of this policy.

V. Procurement by all Government Departments shall give priority to the vendors offering recyclable/reusable products/take back products/programmes by giving additional weightage in evaluation of such bids.

a. The option of using CSR funds for procurement and setting up of waste management infrastructure shall be explored.

b. The Government shall explore the option of installing reverse vending machines or similar systems at strategic locations to encourage responsible disposal of recyclables.

### **Efficient and Effective SWM**

Stream-wise collection and transportation of solid waste

I. Local bodies shall

a. Undertake regular door-to-door collection of segregated waste from all the domestic, commercial and bulk generators, within their jurisdiction.

b. Adopt separate collection cycles (a) for biodegradable and non-biodegradable wastes (b) for households, bulk generators (commercial/institutional) and market wastes. (c) street sweeping waste and black spots, as applicable.

c. Collect Sanitary and Domestic Hazardous Waste along with dry waste or the most frequently collected waste stream. Alternatively, drop off points may also be set-up for such wastes. The means of disposal shall be laid out by the local body.

d. Draw up a time table for collection of solid waste from all generators and public dustbins and strictly comply with the same.

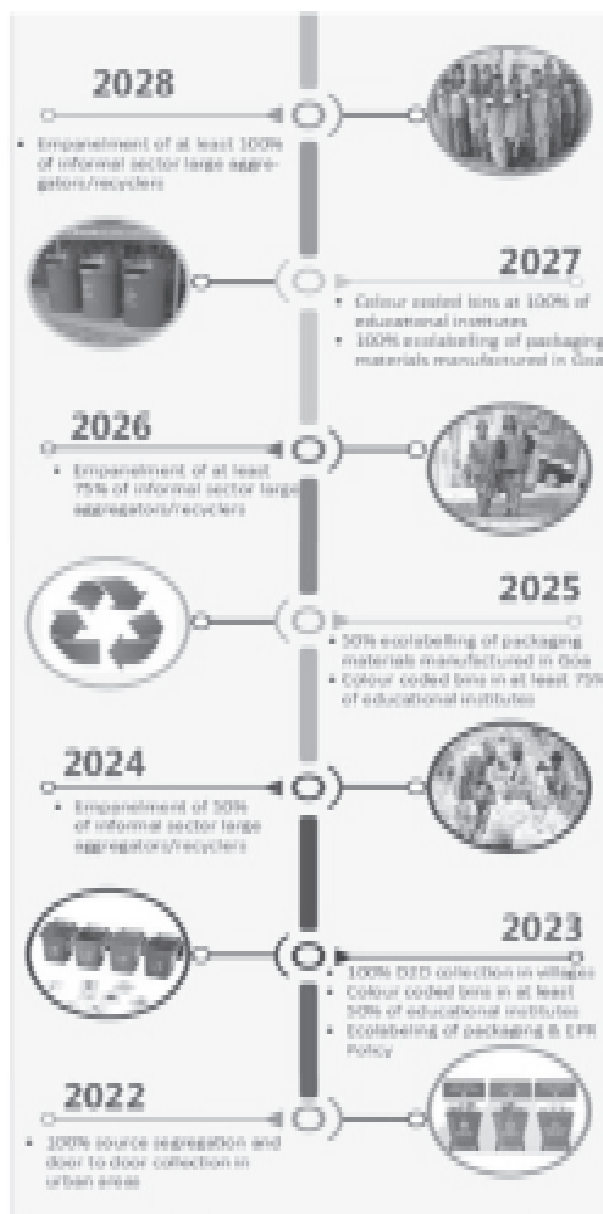
e. Hold citizens accountable for handing over the solid waste in a segregated manner and form as stipulated by them.

f. Instruct citizens to make use of the colour coded dustbins to dispose the waste generated at public places.

g. Set up waste handover/deposit stations as and when deemed necessary to provide means for citizens to conveniently dispose their waste.

h. Be responsible for street sweeping and cleanliness of public areas and other areas of public importance.

i. Deploy suitable vehicles (standardised across the State) for the collection and transportation of solid waste, based on quantum of solid waste, the terrain and distances of routes.



**Figure 11: Targets for waste segregation**

j. Use covered vehicle transportation of the collected solid waste to designated processing facilities.

k. Install a GPS tracking system or other vehicle tracking device for all vehicles deployed for the purpose of waste collection and transportation.

l. Build and maintain the transfer point platform wherever required for transfer of solid waste collected.

m. Strive to minimise transportation and avoid multiple handling of waste.

» If the cluster level processing facility is within ten kilometres from the end point of the collection cycle, the primary vehicle of the local body shall have the option to carry the waste directly to the processing facility

» Where distance is greater than ten kilometres to processing facility, the local body must set up an MRF or sorting station to be able to handle at least the incoming dry waste. Regular composting, small biogas plants, OWC's or biomethanation plants may be explored for treatment of wet waste based on waste quantum and space availability.

» Village Panchayats surrounding the Municipal Councils having MRFs and/or biomethanation plants may have an arrangement with the ULB's to use their facilities based on mutually agreed terms.

n. Strive to achieve 100% efficiencies in collection and transportation of solid waste.

o. Suitably fine/punish offenders for burning, littering and throwing of solid waste at public and private places in accordance with the applicable bye-laws.

p. Appoint adequate number of officers/'Marshals' who would be given powers to collect spot fines from those, in violation of the law.

q. Garbage Management Committees shall meet regularly to enable faster and improved decision making and may consult the Goa Waste Management Corporation for any advisory in waste management.

#### **Stream-wise processing of solid waste**

The solid waste treatment and disposal systems shall be designed and developed to cater to the stream wise collection of solid waste and its appropriate processing and disposal.

a. *Generator Level* -. Citizens/bulk generators shall be instructed to suitably treat the bio-degradable/organic waste generated within their premises through composting, small biogas plants or Organic Waste Convertors (OWC's). If not, it shall be stored for collection by the local body as per the stipulated guidelines.

Slaughter waste may directly be disposed at the CBWTF at Kundaim by the waste generator as per mutually agreed terms. The generator of such waste may also treat the waste at source using scientific methods such as composting/biogas generation/BSF etc. Slaughter waste may also be disposed by the generator to any animal feed processing industry or rendering unit authorized by the SPCB that can further process it into by-products such as fish meal, animal feed or manure.

b. *Village Panchayat Level*—Panchayats shall set up MRFs to be able to suitably deal with both wet and dry waste. The best suited method of composting may be determined based on the quantum of wet waste received. Non bio-degradable waste shall be sorted into its various recyclable fractions and sold to authorized collectors or recyclers. The non-recyclable RDF shall periodically be sent to cement factories for co-processing or any other approved means of disposal.

c. *ULB Level*-All ULB's shall maintain, and if required, upgrade their existing MRFs depending on quantum of waste to enable a higher resource recovery and system efficiency. Wet waste management shall be according to the quantum of waste generated as well as proximity to the nearest CLIF.

Local bodies must make best use of all the equipment supplied to them under various State and Central Government Schemes, or in any other CSR schemes.

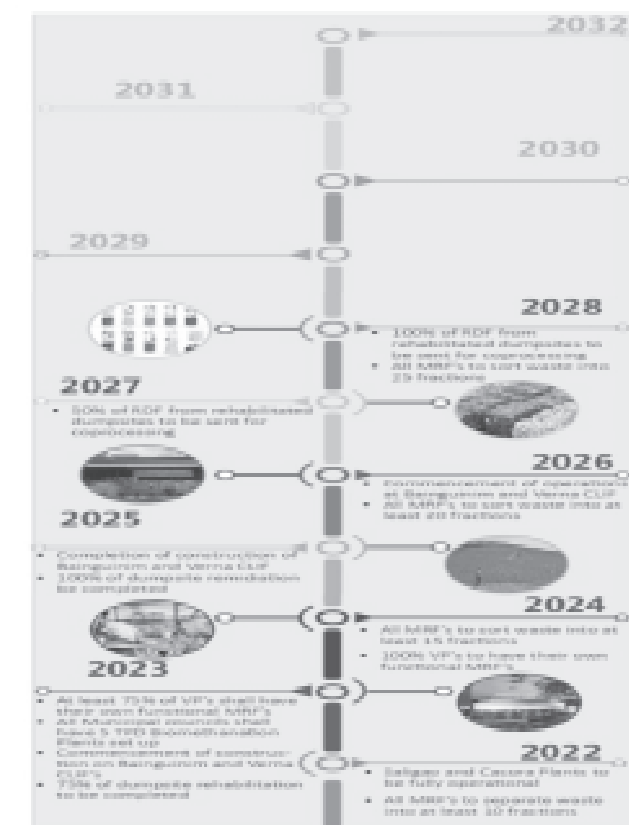
d. *'Cluster' Level*—The Government shall develop an SWM processing facility at each of the identified clusters. Cluster Level Integrated Facility (CLIF) comprising biomethanation plant for processing of bio-degradable waste and resource recovery centres for non-bio-degradable waste shall be established at Saligao, Bainguinim, Cacora and Verna. Engineered landfills shall be developed at Saligao CLIF and Cacora CLIF for management of inert materials.

e. *Regional Level*— All other types of waste shall be transported by the local bodies to its respective processing facility at the regional level for treatment and disposal. Alternatively, pick up by the regional facility may be arranged by Panchayats and ULB's based on applicable rates. These include

- » Hazardous Waste Treatment Plant at Pissurlem
- » Biomedical Waste Treatment Facility at Kundaim
- » Construction and Demolition Waste Management Facility at Bicholim
- » E-Waste Dismantling Facility at Pissurlem

f. The Government has installed mini incinerators at schools and educational institutions for disposal of sanitary napkins. However, with the Common Biomedical Waste Treatment Facility (CBWTF) at Kundaim now fully operational, efforts shall be made to segregate and periodically collect sanitary waste from educational institutions and other generators.

g. There are eleven legacy dump sites including those located in Margao, Mormugao, Curchorem and Mapusa. These shall be suitably remediated in a phased manner and the area made available for setting up of SWM facilities or other appropriate purposes.



**Figure 12: Targets for setting up of waste management infrastructure**

**3. Create awareness and bring about behavioural change.**

- a. The Government, either directly or through private sector participation, shall conduct awareness programmes and campaigns on waste management across stakeholders.
- b. All personnel (Safai Karmacharis) involved in SWM activities shall be issued medical insurance policies. Skill development, free counselling, health check-ups etc. shall also be explored.
- c. Sensitisation programmes on the importance of management of solid waste, cleanliness and hygiene aimed at students at school and colleges shall be conducted periodically.
- d. Management of solid waste shall also be made an integral part of the curriculum at schools and colleges in the State.
- e. Special awards or recognition may be granted to schools, Resident Welfare Associations (RWA's) or even bulk generators for exemplary performance or innovative practices in waste management.
- f. Campaigns and initiatives to incentivize RWA's, Bulk Generators or individuals for handover of segregated waste shall be explored.
- g. IEC activities focussed on tourists shall also be designed to make them aware of the expected waste management practices as well as possible penalties in case of wrongdoings. Tickets, tourism information booklets, tourism passes, car and bike rental outlets etc. may be used as means of spreading informative literature to tourists.
- h. Information and awareness creation shall also be integrated into popular events organized in the state such as IFFI, Goa Open Arts Festival, Sunburn, Carnival etc.
- i. Local news channels and media shall also be effectively used by the State as a means to share best practices and general awareness on waste management.
- j. Informal sector collectors and aggregators shall also be sensitized on safe disposal of non-recyclable and hazardous substances.
- k. Brands selling single use plastic shall be encouraged to offer incentives to consumers for collection of wrappers and plastic packaging generated through the sale of their products.
- l. Collection and clean-up drives shall be periodically organized by local bodies.

**4. Introduce ICT based approach to SWM**

- a. There is a need for a full-fledged ICT based SWM system to be developed, with a helpline, call centre, real time monitoring of vehicles and manpower, monitoring operations of waste processing facilities, route planning, scheduling, diversion during festivals/peak seasons, planning during rains etc. and provision of alerts to citizens in the event of incidents/emergencies.
- b. Through a data driven approach, GWMC and local bodies can provide better information to citizens & agencies; improve resource productivity through monitoring & take informed decisions for overall operations & management of solid waste.



c. An integrated central command and control centre shall be developed by GWMC; to regulate, monitor and supervise the entire operations of SWM on real time basis. Control centres shall be set up at Cluster/ULB level and then integrated with the command and control centre at GWMC.

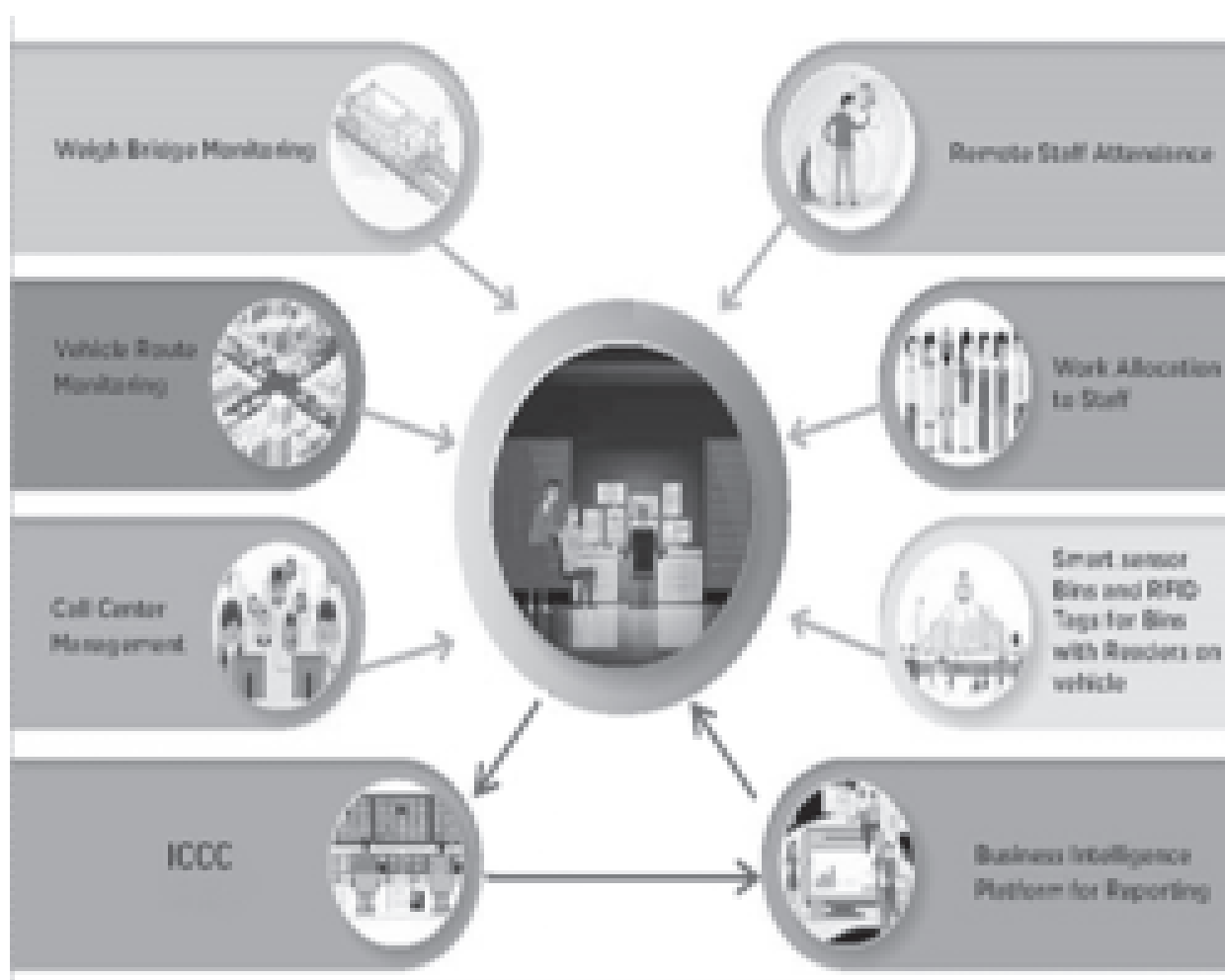
d. Appropriate technological interventions such as real-time tracking of vehicles through GPS equipment, RFID for assessment of extent of collection, QR codes for analysing extent of segregation and D2D collection coverage, CCTV network for identification of blackspots, sensor bins at high tourist footfall locations, etc. shall be initiated and developed in a phased manner throughout the State.

e. The central command and control centre of GWMC shall be linked with the command and control centre at GSPCB.

f. Weigh bridges shall be installed at all MRFs.

g. Local bodies, as the case may be, shall introduce biometric devices to register the attendance of personnel (Safai Karamcharis) involved in SWM.

h. Reports in the form of a dashboard will be made accessible to different types of users through a web based dashboard and mobile application (Android & iOS platforms).



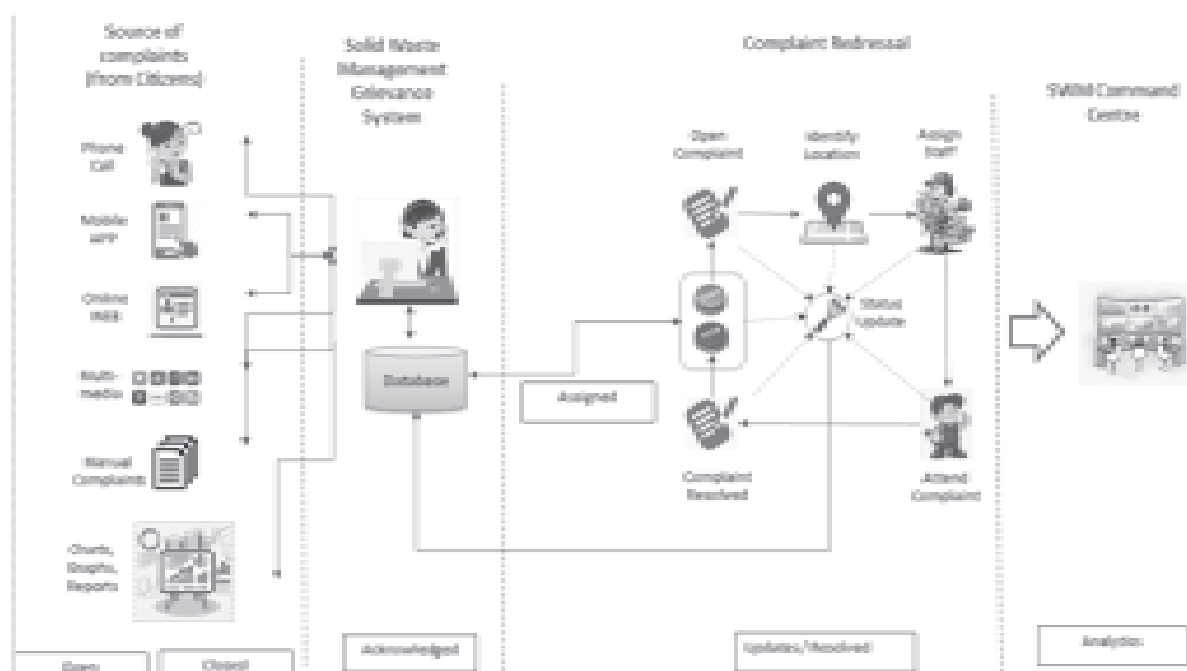


Figure 13: Components of the ICT system

### Legal and Institutional Framework

a. The existing legal and institutional framework provides an enabling environment for management of solid waste in the State. **Appendix E** of the Policy sets out the existing legal framework pertaining to SWM in the State of Goa.

b. This Policy proposes various steps to be taken by the local bodies and other institutions in combating challenges in SWM in line with the mandates given under Solid Waste Management Rules, 2016.

c. The roles and responsibilities of key stakeholders in the spectrum of SWM in the light of suggestions and recommendations given in this Policy and SWM Rules, 2016 are set out below.

Stakeholders	Roles and Responsibilities
Department of Urban Development	<ul style="list-style-type: none"> <li>Administrative department which exercises administrative control over the Municipal Councils in Goa and the Corporation of the City of Panaji</li> <li>Frame Bye-Laws for MSW Management to provide ULBs a basis for waste management</li> <li>Assist GWMC in the preparation of Strategy and State Policy for Solid Waste Management Strategy for the State</li> <li>Liaison with central Government for various schemes and utilize central fund on waste management schemes and projects</li> </ul>
Department of Town & Country Planning	<ul style="list-style-type: none"> <li>Ensure that Regional Plan prepared by the department has provisions for setting up of integrated solid waste processing and disposal facilities</li> <li>Identify and reserve suitable large parcels of land for setting up of regional waste processing facilities and engineered landfills.</li> </ul>

Department of Science, Technology and Waste Management	<ul style="list-style-type: none"> <li>• Providing all maps and data as required by GWMC or any other concerned department at no cost.</li> <li>• Include a provision for onsite storage and treatment for all waste streams for new construction licence</li> <li>• Implements various activities, programs and schemes for management of different types of waste that are generated in the State of Goa</li> <li>• Inculcating a scientific temperament in students through activities and programs in educational institutions</li> <li>• Scientific management and treatment of all kinds of waste</li> </ul>
Department of Environment	<ul style="list-style-type: none"> <li>• Implements various schemes towards popularization of environmental awareness and promotion of appropriate environmental projects relevant to the needs of the State.</li> <li>• Enforcement of "environmental protection/pollution control" laws'</li> <li>• Formulate an EPR Policy for the State</li> </ul>
City Corporation/Municipal Councils/ /Panchayats	<ul style="list-style-type: none"> <li>• Door to door collection of segregated solid waste from households, commercial establishments and other bulk generators and transportation thereof to the designated processing and facilities using vehicles as prescribed in the Policy;</li> <li>• Street sweeping and cleanliness of public areas and other areas of public importance.</li> <li>• Provision of public receptacles, depots and places for the temporary deposit of garbage, offensive matter, carcasses of dead animals accumulating in their jurisdiction.</li> <li>• Take up public awareness programme to educate general public on the solid waste management on the aspects such as (i) importance of cleanliness (ii) segregation at source (iii) handover to the waste collector as per the arrangement made by local body etc. and bring about behavioural change.</li> <li>• Promote concept of reduce, reuse, recover and recycle and Extended Producer Responsibility</li> <li>• Take required measures to reduce proportion of waste going to landfill and develop newer, greener and more efficient technologies in this regard.</li> <li>• Construct or facilitate construction of integrated waste processing facilities, sanitary landfill facilities etc.</li> <li>• Develop non bio-degradable waste resource recovery centres and organic waste composting units</li> <li>• Adopt integrated SWM approach covering primary collection of solid waste from doorstep, its transportation, processing and disposal of waste at the Sanitary Landfill Facilities in a cost effective manner.</li> </ul>

- Promote PPP arrangement or contracting arrangement with private sector adopting a very fair and transparent method of selection.
- Develop and implement projects in accordance with the Policy and ensure timely completion.
- Establish a system to recognise organizations of waste pickers or informal waste collectors and promote and establish a system for integration to facilitate their participation in solid waste management including door to door collection of waste
- Provide training on solid waste management to waste-pickers and waste collectors;
- Frame bye-laws incorporating the provisions of this Policy and ensure timely implementation
- Prescribe from time to time user fee as deemed appropriate and collect the fee from the waste generators on its own or through authorized agency.
- Levy and collect fines in accordance with applicable laws.

GWMC

- Facilitate development/develop waste management facilities in the State
- Constitute an WM Cell to facilitate all activities pertaining to SWM in the State
- Develop integrated command and control centre for SWM and associated facilities for an ICT based SWM
- Frame policies for effective management of wastes
- Manage facilities which have already been established or in the process of establishment
- Promote and implement schemes for managing waste at household, institutional, corporate and local body level
- Develop database on technologies and best practices to tackle waste problem in the State
- Develop facilities for information dissemination and mass awareness to the general public on solid waste management
- Provide aid to organizations, individuals, institutions, panchayats and municipalities to develop and implement new models of waste management.
- Undertake schemes or works with other agencies and corporate bodies.
- Work out techniques, schemes and projects for reducing carbon footprints.

	<ul style="list-style-type: none"> <li>• To provide or cause to be provided amenities and common facilities in waste management area/site and construct and maintain works and building thereof.</li> <li>• Explore the option of offsetting emissions through the sale/generation of Carbon Credits</li> </ul>
Goa State Pollution Control Board (GSPCB)	<ul style="list-style-type: none"> <li>• Monitor and regulate the pollution caused due to improper SWM</li> <li>• Provide authorization for setting up municipal waste processing and disposal facilities including sanitary landfills based on the set criteria</li> <li>• Monitoring compliance to MSW Rules by bulk waste generators and other stakeholders</li> <li>• Conduct random waste audits at commercial or industrial facilities for waste measurement and assessment</li> <li>• Approve new waste treatment and/or recycling technologies</li> </ul>
Garbage/Waste Management Committee	<ul style="list-style-type: none"> <li>• Providing necessary assistance to local authority in selection of places for providing public receptacles for temporary deposit of garbage/waste generated in the garbage management zone</li> <li>• Conduct awareness programme to ensure reduction, re-use and recycling of garbage/waste</li> </ul>
Waste Generator	<ul style="list-style-type: none"> <li>• Segregate waste at household/generator level prior to handing it over to the ULB</li> <li>• Shall not throw, burn or bury the solid waste on streets, open public spaces outside the premises or in the drain or water bodies.</li> <li>• Make use of dustbins placed at public places</li> <li>• Pay such user fee for solid waste management, as specified in the bye-laws of the local bodies.</li> <li>• No person shall organise an event or gathering of more than one hundred persons at any unlicensed place without intimating the local body, at least three working days in advance and such person or the organiser of such event shall ensure segregation of waste at source and handling over of waste to waste collector or agency as specified by the local body.</li> <li>• Report illegal dumping of solid waste and black spots to designated officers/ helpline of ULB</li> <li>• Wrap securely the used sanitary waste like diapers, sanitary pads etc., and shall place the same in the bin meant for dry waste or non-bio-degradable waste;</li> <li>• Shops, commercial establishments and businesses should store segregated waste onsite.</li> </ul>

	<ul style="list-style-type: none"> <li>• Street vendor shall keep suitable containers for storage of waste generated during the course of his / her activity such as food waste, disposable plates, cups, cans, wrappers, leftover food, vegetables, fruits, etc., and shall deposit such waste at waste storage depot or container or vehicle as notified by the local body.</li> <li>• All resident welfare and market associations shall in partnership with the local body ensure segregation of waste at source by the generators as prescribed in rules, facilitate collection of segregated waste in separate streams, handover recyclable material to either the authorised waste pickers or the authorised recyclers.</li> <li>• The bio-degradable waste shall be processed, treated and disposed-off through composting or bio-methanation within the premises as far as possible. The residual waste shall be given to the waste collectors or agency as directed by the local body.</li> <li>• All gated communities, institutions, hotels and restaurants shall in partnership with the local body, ensure segregation of waste at source by the generators as prescribed in rules, facilitate collection of segregated waste in separate streams, handover recyclable material to either the authorised waste pickers or the authorised recyclers.</li> </ul>
State Level Advisory Board	<ul style="list-style-type: none"> <li>• State Level Advisory Body shall meet at least one in every six months to review the matters related to implementation of the SWM Rules, 2016 and this Policy- Develop and implement strategy on solid waste management</li> <li>• Give advice to State Government for taking measures that are necessary for expeditious and appropriate implementation of the SWM Rules, 2016</li> </ul>
Department of Panchayats	<ul style="list-style-type: none"> <li>• Nodal department for SWM in all 190 Village Panchayats</li> <li>• Provide approvals and funding for construction and development of waste management infrastructure in Panchayats</li> </ul>
Tourism Department	<ul style="list-style-type: none"> <li>• Include in its promotion material, literature on awareness of SWM practices proposed under the policy- Orient and inform tourists with respect to significance of adhering to the rules pertaining to SWM</li> <li>• Implement and oversee beach cleaning activities</li> </ul>
Education Department	<ul style="list-style-type: none"> <li>• Preparation of curriculum that creates awareness pertaining to SWM among students, which could be taught at schools</li> <li>• Inculcate practices among students with respect to SWM at educational institutions</li> </ul>



Industries Department & Goa Industries Development Corporation	<ul style="list-style-type: none"> <li>• With a view of effective SWM within the industrial area, allocate at least five percent of the industrial area for SWM activities.</li> <li>• Allocate suitable land for setting up of CLIF's and Regional Facilities</li> </ul>
Goa State Infrastructure Development Corporation Limited	<ul style="list-style-type: none"> <li>• Make suitable provisions for SWM during construction as well as implementation of infrastructure projects such as ports, airports etc.</li> </ul>
Goa Energy Development Agency	<ul style="list-style-type: none"> <li>• Implement schemes to provide incentives or subsidies for manufacturers and users of innovative and decentralized waste management technologies such as kitchen biogas plant, biomass briquetting etc.</li> </ul>
Kadamba Transport Corporation	<ol style="list-style-type: none"> <li>1. Through IEC, promote awareness among users of public transport on the significance of SWM</li> </ol> <ul style="list-style-type: none"> <li>• Installation of colour coded dustbins at bus stands for collection of solid waste</li> </ul>
Forest Department	<ul style="list-style-type: none"> <li>• Through IEC, promote awareness among forest dwellers/hikers/tourists/etc. on the need and significance of SWM</li> <li>• Identify, train and empower marshals to ensure proper waste management practices among those visiting the forest</li> </ul>

## Penalties/Incentives/Charges

### Penalties

a. The local bodies shall levy spot fines on offenders for littering, open burning or failure to comply with the provisions of the SWM Rules, as specified in the Model SWM Bye-Laws and Goa Non-Biodegradable Garbage Management Act.

b. Local Bodies shall have the power to alter or amend or vary the type of offence and penalty amounts if circumstances require it to do so.

c. As recommended in SWM Rules, 2016 the local body may levy spot fines by

» Identifying and deploying marshals/nuisance detectors to monitor littering, garbage dumping etc. and penalise offenders.

» A hand held device may be provided to the Marshals, to enable them to issue digitally-printed challans to offenders on the spot.

» The device would allow Marshals to record the name of the offender, and to also click photos of the offence being committed.

» Data from the device shall be compiled at central database for better monitoring and enforcement.

» Even agencies handling waste management should be enabled to be booked by Marshals for deviating from bulk waste collection or for unscientific disposal.

d. Alternatively, the flying squad constituted for special enforcement drives under Goa Non-Biodegradable Garbage (Control) Act, 1996 may be further strengthened to equip the powers envisaged for Marshals.

e. Various notifications issued under Section 7 of the Goa Non-Biodegradable Garbage (Control) Act, 1996 regulating the size, type and thickness of plastics shall be strictly implemented to curb plastic menace in the State.

f. Government shall take steps to ensure a complete ban on single use plastics and plastic carry bags below the specified quality as stipulated in the recent amendments of the PWM Rules of 2016

### **Incentives**

a. The State may recognise and felicitate a model school, village panchayat, educational institution, office premise, RWA and/or any other bulk generators that have put in practice innovative, effective and sustainable SWM practices.

b. The State shall encourage citizens to manage their waste by promoting and subsidizing use of suitable treatment technologies and green products.

c. Incentives may also be explored for establishments intending to set up their manufacturing units for producing waste management equipment, infrastructure and bio-degradable products/materials in the State through subsidies, tax rebates or other relevant means.

d. Local bodies shall set up procurement systems either directly or through authorized collectors in order to incentivize waste generators to sort and segregate recyclables from the waste stream.

### **User Charge**

a. The local body shall levy a charge/fee for door-to-door collection of waste from all generators, as stipulated by the Model MSW Bye-Laws

b. The fee may be altered at the discretion of the local body on a case to case basis based on population, social and economic status, geographical conditions such as terrain etc.

c. Adopting the principles of “pay as you throw” policy, the local body may provide for variable rates based on the type and quantum of waste generated for bulk waste generators.

d. Retail outlets selling plastic bags, irrespective of the thickness, could be mandated to pay a plastic cess which may be recovered from the consumers to discourage usage

### **Implementation Modes**

Local bodies shall explore the various options of development and operation of infrastructure pertaining to SWM. Some of these include

I. Available budgetary allocation, funds and grants by the Government through the 15<sup>th</sup> Finance Commission, Swacchh Bharat Mission etc.

II. Utilize Corporate Social Responsibility (CSR) funds from corporates to set up waste management infrastructure such as collection vehicles, MRFs and sorting centres along with composting facilities.

III. The State EPR Policy shall ensure adequate funding for collection, transportation and disposal of waste through brands, producers or manufacturers operating in the state of Goa.

IV. Engagement with the private sector in waste collection and setting up and/or operation of take back systems and MRFs.

The local bodies shall wherever possible enter into performance based payment contracts so as to ensure performance of contracts.

GWMC shall assist local bodies in-

a. Developing standard toolkit setting out

» Performance targets to local bodies with mechanisms for recording and monitoring the same

» Project development activities and selection of private partner

b. Provision of draft bid documents to be used as template by the ULBs

» Setting mechanism/system in place for review and vetting of contract documents prior to issue

» Setting up payment guarantee mechanisms.

## Appendix A - Cluster Details

### Cluster 1: Saligao

Taluka included	Group	Clusterwise VP/MC/CC included	Population (2018)	Waste Generation TPD (2018)			
				Total	Biodegradable	Non-Biodegradable	Domestic Hazardous
Pernem	C1-a	Arambol	5,630	6.26	3.44	2.69	0.13
		Mandrem	8,731	3.56	1.96	1.53	0.07
		Parcem	11,852	7.47	4.11	3.21	0.15
		Agarwada-Chopdem	2,642	0.9	0.49	0.39	0.02
		Corgao	6,939	1.66	0.91	0.71	0.03
		Dhargal	6,028	2.02	1.11	0.87	0.04
		Paliem	2,921	0.97	0.53	0.42	0.02
		Querim - Tiracol	3,371	1.17	0.64	0.5	0.02
		Tuem	2,962	0.66	0.36	0.28	0.01
		Virnoda	4,244	1.25	0.69	0.54	0.02
		Pernem (M CI)	5,387	3.65	2.01	1.57	0.07
		<b>Total</b>	<b>60,708</b>	<b>29.58</b>	<b>16.27</b>	<b>12.72</b>	<b>0.59</b>
Pernem	C1-b	Allorna	2,715	0.76	0.42	0.33	0.02
		Casarvarnem-Chandel-Hasapur	2,662	0.76	0.42	0.33	0.02
		Ibrampur - Hankhane	2,702	0.7	0.38	0.3	0.01
		Ozarim	1,729	0.36	0.2	0.16	0.01
		Tamboxem-Mopa-Ugvem	2,941	1.09	0.6	0.47	0.02

Taluka included	Group	Clusterwise VP/MC/CC included	Population (2018)	Waste Generation TPD (2018)			
				Total	Biodegradable	Non-Biodegradable	Domestic Hazardous
		Torxem	2,550	1.04	0.57	0.45	0.02
		Warkhand-Nagzar	2,361	0.56	0.31	0.24	0.01
		Khajnem-Amere-Porscadem	1,376	0.59	0.32	0.25	0.01
		<b>Total</b>	<b>19,037</b>	<b>5.86</b>	<b>3.22</b>	<b>2.52</b>	<b>0.12</b>
Bardez	C1 c	Mapusa MC	43,487	38.59	21.23	16.59	0.77
		Siolim-Marna	1,318	5.28	2.9	2.27	0.11
		Colvale	5,145	2.38	1.31	1.02	0.05
		Moirá	4,587	1.64	0.9	0.7	0.03
		Assagao	4,661	1.93	1.06	0.83	0.04
		Assonora	5,057	2.1	1.16	0.9	0.04
		Camorlim	3,139	1.13	0.62	0.49	0.02
		Nadora	1,272	0.65	0.36	0.28	0.01
		Oxel	2,882	0.55	0.3	0.24	0.01
		Pirna	2,716	1.16	0.64	0.5	0.02
		Rivora	2,783	1.32	0.73	0.57	0.03
		Sirsaim	3,179	1.43	0.78	0.61	0.03
		Tivim	9,831	3.89	2.14	1.67	0.08
		<b>Total</b>	<b>90,057</b>	<b>62.04</b>	<b>34.12</b>	<b>26.68</b>	<b>1.24</b>
Bardez	C1 d	Siolim Sodiem	11,558	3.9	2.14	1.68	0.08
		Guirim	5,269	2.09	1.15	0.9	0.04
		Anjuna-Caisua	10,291	12.52	6.89	5.38	0.25
		Calangute	14,897	37.7	20.74	16.21	0.75
		Saligao	6,673	2.56	1.41	1.1	0.05
		Candolim	9,206	24.73	13.6	10.63	0.49

Taluka included	Group	Clusterwise VP/MC/CC included	Population (2018)	Waste Generation TPD (2018)			
				Total	Biodegradable	Non-Biodegradable	Domestic Hazardous
		Nerul	4,858	2.31	1.27	0.99	0.05
		Reis Magos	9,462	3.67	2.02	1.58	0.07
		Pilerne	8,828	4.13	2.27	1.78	0.08
		Penha-de-Franca	18,027	8.37	4.6	3.6	0.17
		Salvador Do Mundo	7,488	2.91	1.6	1.25	0.06
		Socorro	13,487	6.69	3.68	2.88	0.13
		Aldona	9,720	4.47	2.46	1.92	0.09
		Arpora-Nagoa	5,012	3.52	1.94	1.51	0.07
		Bastora	4,231	1.78	0.98	0.77	0.04
		Nachinola	3,041	0.93	0.51	0.4	0.02
		Parra	4,813	2.5	1.37	1.07	0.05
		Pomburpa- Olaulim	3,798	1.3	0.72	0.56	0.03
		Sangolda	4,920	2.54	1.39	1.09	0.05
		Ucasaim-Paliem-Punola	3,584	1.4	0.77	0.6	0.03
		Verla-Canca	8,053	3.53	1.94	1.52	0.07
		<b>Total</b>	<b>1,67,217</b>	<b>133.55</b>	<b>73.45</b>	<b>57.43</b>	<b>2.67</b>
Pernem, Bardez		Pernem Cluster Total	3,37,018	231.03	127.07	99.35	4.62

Table 3: Saligao Cluster waste generation numbers

**Cluster 1.1: Bicholim**

Taluka included		Clusterwise VP/MC/CC included	Population (2018)	Waste Generation TPD (2018)			
				Total	Biodegradable	Non-Biodegradable	Domestic Hazardous
Sattari	C1.1 d	Cotorem	4,359	0.67	0.37	0.29	0.01
		Guleli	3,338	0.97	0.53	0.42	0.02
		Nagargao	5,040	1.51	0.83	0.65	0.03
		Sanvardem (Sattari)	3,556	1.29	0.71	0.55	0.03
		<b>Total</b>	<b>16,293</b>	<b>4.43</b>	<b>2.44</b>	<b>1.9</b>	<b>0.09</b>
Sattari	C1.1 c	Dongurli-Thane	5,890	2.2	1.21	0.94	0.04
		Querim (Sattari)	6,074	2.7	1.49	1.16	0.05
		<b>Total</b>	<b>11,964</b>	<b>4.9</b>	<b>2.69</b>	<b>2.11</b>	<b>0.1</b>
Sattari	C1.1 b	Honda/Onda	10,130	3.19	1.76	1.37	0.06
		Bhironda	4,422	0.62	0.34	0.27	0.01
		Mauzi	4,499	1.14	0.63	0.49	0.02
		Morlem	3,672	0.81	0.44	0.35	0.02
		Pissurlem	3,455	0.6	0.33	0.26	0.01
		Poriem	5,574	1.68	0.92	0.72	0.03
		Valpoi (M CI)	9,285	4.84	2.66	2.08	0.1
		<b>Total</b>	<b>41,038</b>	<b>12.88</b>	<b>7.09</b>	<b>5.54</b>	<b>0.26</b>
Bicholim	C1.1 a	Pale-Cothambi	6,785	1.15	0.63	0.49	0.02
		Amona	3,067	0.99	0.54	0.43	0.02
		Cudnem	3,550	0.56	0.31	0.24	0.01
		Latambarcem	7,202	2.19	1.21	0.94	0.04
		Navelim (Bicholim)	2,890	0.83	0.46	0.36	0.02

Taluka included		Clusterwise VP/MC/CC included	Population (2018)	Waste Generation TPD (2018)			
				Total	Biodegradable	Non-Biodegradable	Domestic Hazardous
		Surla	3,884	1	0.55	0.43	0.02
		Velguem	2,799	0.87	0.48	0.38	0.02
		Sanquelim (M CI)	15,061	7.58	4.17	3.26	0.15
		Carapur- Sarvona	9,966	3.21	1.77	1.38	0.06
		Adwalpale	1,485	0.44	0.24	0.19	0.01
		Menkurem-Dhumashe	1,767	0.32	0.18	0.14	0.01
		Maem-Vaiguinim	9,146	2.85	1.57	1.23	0.06
		Mulgao	4,224	1.27	0.7	0.55	0.03
		Narora	1,950	0.61	0.34	0.26	0.01
		Ona-Maulinguem	4,505	1.35	0.74	0.58	0.03
		Piligao	2,757	1.21	0.67	0.52	0.02
		Salem (Sal)	3,731	1.03	0.57	0.44	0.02
		Sirigao	1,650	0.68	0.37	0.29	0.01
		Bicholim (M CI)	18,462	9.28	5.1	3.99	0.19
		<b>Total</b>	<b>1,04,879</b>	<b>37</b>	<b>21</b>	<b>16</b>	<b>1</b>
Bicholim, Sattari		Bicholim-Sanquelim Cluster Total	1,74,174	60	33	26	1

**Cluster 2: Bainguinim**

Taluka included	Group	Clusterwise VP/MC/CC included	Population (2018)	Waste Generation TPD (2018)			
				Total	Biodegradable	Non-Biodegradable	Domestic Hazardous
Tiswadi	C2 a	Panaji CC	40,903	44.22	24.32	19.02	0.88
		Taleigao	29,021	12.64	6.95	5.44	0.25
		<b>Total</b>	<b>69,924</b>	<b>56.86</b>	<b>31.28</b>	<b>24.45</b>	<b>1.14</b>
Tiswadi	C2 b	Jua	4,185	1.61	0.88	0.69	0.03
		Cumbharjua	5,471	1.93	1.06	0.83	0.04
		Corlim	7,374	3.83	2.11	1.65	0.08
		Chimbel	18,873	7.28	4	3.13	0.15
		Murda - Mercedes	9,737	5.5	3.02	2.36	0.11
		Calapor-St Cruz	16,683	6.28	3.46	2.7	0.13
		Bambolim Talaulim	11,768	5.27	2.9	2.27	0.11
		Ella - Bainguinim - Panelim (Old Goa)	8,997	4.21	2.31	1.81	0.08
		St. Andre (Goa Velha)	4,408	2.33	1.28	1	0.05
		Mercurim-St-Lawrence (Agassaim)	5,036	2.06	1.13	0.89	0.04
		Azossim Mandur	4,301	1.42	0.78	0.61	0.03
		Batim	2,113	0.9	0.49	0.39	0.02
		Carambolim	5,449	3.4	1.87	1.46	0.07
		Chorao Madel	5,756	2.55	1.4	1.1	0.05
		Goltim Navelim	2,777	1.4	0.77	0.6	0.03
		Neura-O-grande, neura-O-Pequeno	2,099	0.92	0.51	0.4	0.02
		Siridao-Palem	2,466	1.08	0.6	0.47	0.02
		Sao-Matias / Malar	2,298	0.91	0.5	0.39	0.02
		<b>Total</b>	<b>1,19,791</b>	<b>52.87</b>	<b>29.08</b>	<b>22.74</b>	<b>1.06</b>

Taluka included	Group	Clusterwise VP/MC/CC included	Population (2018)	Waste Generation TPD (2018)			
				Total	Biodegradable	Non-Biodegradable	Domestic Hazardous
Ponda	C2 c	Betkin-Candola	7,722	2.63	1.45	1.13	0.05
		Marcaim	6,388	2.55	1.4	1.09	0.05
		Tivrem-Orgao	7,076	2.32	1.28	1	0.05
		Curti - Candepar	22,773	5.95	3.27	2.56	0.12
		Queula	7,054	2.78	1.53	1.19	0.06
		Borim	8,828	1.97	1.08	0.85	0.04
		Bandora	13,900	4.83	2.65	2.07	0.1
		Betora - Nirankal - Conxem - Codar	9,807	3.06	1.68	1.32	0.06
		Bhoma-Adcolna	4,871	2.14	1.17	0.92	0.04
		Durbhat	4,046	1.13	0.62	0.49	0.02
		Panchawadi	4,477	1.08	0.6	0.47	0.02
		Querim (Ponda)	3,600	0.83	0.46	0.36	0.02
		Shiroda	14,867	6.47	3.56	2.78	0.13
		Veling-Priol-Cuncoliem	12,115	4.26	2.35	1.83	0.09
		Savoi/Verem-Vaghurme	3,793	0.8	0.44	0.34	0.02
		Volvoi	1,856	0.48	0.26	0.2	0.01
		Wadi-Talauli	3,267	1.14	0.63	0.49	0.02
		Cundaim	4,026	1.25	0.69	0.54	0.03
		Usgao-Gangem	14,291	6.17	3.39	2.65	0.12
		Ponda (M CI)	25,290	15.2	8.36	6.53	0.3
<b>Ponda</b>			<b>1,80,047</b>	<b>67.03</b>	<b>36.87</b>	<b>28.83</b>	<b>1.34</b>
<b>Tiswadi, Ponda</b>		<b>Bainguinim Cluster Total</b>	<b>3,69,763</b>	<b>176.77</b>	<b>97.22</b>	<b>76.01</b>	<b>3.54</b>

**Table 4: Bainguinim Cluster waste generation numbers**



**Cluster 3: Cacora**

Taluka included	Group	Clusterwise VP/MC /CC included	Population (2018)	Waste Generation TPD (2018)			
				Total	Biodegradable	Non-Biodegradable	Domestic Hazardous
Dharbandora	C3 a	Colem-Sigao	6,333	1.81	0.99	0.78	0.04
		Darbandora	7,852	2.19	1.2	0.94	0.04
		Kirlapal Dabal	6,709	1.06	0.58	0.45	0.02
		<b>Total</b>	<b>20,894</b>	<b>5.05</b>	<b>2.78</b>	<b>2.17</b>	<b>0.1</b>
Dharbandora	C3 b	Molem	3,034	0.76	0.42	0.33	0.02
		Sancordem (Dharbandora)	4,012	0.82	0.45	0.35	0.02
		<b>Total</b>	<b>7,047</b>	<b>1.58</b>	<b>0.87</b>	<b>0.68</b>	<b>0.03</b>
Sanguem	C3 c	Bati	3,471	0.67	0.37	0.29	0.01
		Curdi	3,295	1.08	0.6	0.47	0.02
		Netorli	3,579	1.12	0.62	0.48	0.02
		Kalay (Calem)	4,631	0.91	0.5	0.39	0.02
		Rivona	5,571	1.7	0.94	0.73	0.03
		<b>Total</b>	<b>20,548</b>	<b>5.48</b>	<b>3.02</b>	<b>2.36</b>	<b>0.11</b>
Sanguem	C3 d	Sanvordem (Sanguem)	8,459	3.11	1.71	1.34	0.06
		Uguem	5,101	1.36	0.75	0.58	0.03
		Sanguem (M Cl)	6,696	4.68	2.57	2.01	0.09
		<b>Total</b>	<b>20,256</b>	<b>9.14</b>	<b>5.03</b>	<b>3.93</b>	<b>0.18</b>
Quepem	C3 e	Balli-Adnem	8,077	1.43	0.79	0.62	0.03
		Barcem-Quedem	4,882	0.88	0.49	0.38	0.02
		Cavorem-Pirla	3,818	0.84	0.46	0.36	0.02
		Naquerim- Betul	283	0.15	0.08	0.07	0
		<b>Total</b>	<b>17,060</b>	<b>3.3</b>	<b>1.82</b>	<b>1.42</b>	<b>0.07</b>

Taluka included	Group	Clusterwise VP/MC /CC included	Population (2018)	Waste Generation TPD (2018)			
				Total	Biodegradable	Non-Biodegradable	Domestic Hazardous
Quepem	C3 f	Fatorpa-Quitol	4,226	1.22	0.67	0.53	0.02
		Morpila	3,223	0.48	0.26	0.21	0.01
		<b>Total</b>	<b>7,449</b>	<b>1.7</b>	<b>0.94</b>	<b>0.73</b>	<b>0.03</b>
Quepem	C3 g	Xeldem	9,096	2.12	1.17	0.91	0.04
		Ambaulim	3,208	0.77	0.42	0.33	0.02
		Assolda	3,909	0.9	0.5	0.39	0.02
		Avedem-Cotombi & Chaifi	3,011	0.86	0.48	0.37	0.02
		Molcarnem	3,031	0.71	0.39	0.3	0.01
		Quepem (M Cl)	16,741	9.23	5.08	3.97	0.18
		Curchoem-Cacora (M Cl)	24,627	8.95	4.92	3.85	0.18
		<b>Total</b>	<b>63,623</b>	<b>23.54</b>	<b>12.95</b>	<b>10.12</b>	<b>0.47</b>
Canacona	C3 h	Cotigao	2,776	0.74	0.41	0.32	0.01
		<b>Total</b>	<b>2,776</b>	<b>0.74</b>	<b>0.41</b>	<b>0.32</b>	<b>0.01</b>
Canacona	C3 i	Gaondongrem	5,313	1.47	0.81	0.63	0.03
		<b>Total</b>	<b>5,313</b>	<b>1.47</b>	<b>0.81</b>	<b>0.63</b>	<b>0.03</b>
Canacona	C3 j	Cola	5,754	1.63	0.9	0.7	0.03
		Agonda	4,033	1.53	0.84	0.66	0.03
		Shristhal(Canacona village)	4,936	1.49	0.82	0.64	0.03
		Poinguinim	7,008	2.29	1.26	0.99	0.05
		Loliem-Polem	4,886	1.73	0.95	0.75	0.03
		Canacona (M Cl)	13,210	7.6	4.18	3.27	0.15
		<b>Total</b>	<b>39,828</b>	<b>16.28</b>	<b>8.95</b>	<b>7</b>	<b>0.33</b>
<b>Cacora</b>		<b>Cacora Cluster Total</b>	<b>2,04,793</b>	<b>68.31</b>	<b>37.57</b>	<b>29.37</b>	<b>1.37</b>

**Table 5: Cacora Cluister Weaste generation numbers**

**Cluster 4: Verna**

Taluka included	Group	Clusterwise VP/MC /CC included	Population (2018)	Waste Generation TPD (2018)			
				Total	Biodegradable	Non-Biodegradable	Domestic Hazardous
Mormugao	C4 a	Chicalim	14,971	6.11	3.36	2.63	0.12
		Sancoale	24,892	7.54	4.15	3.24	0.15
		Cortalim-Quelossim	13,285	5.25	2.89	2.26	0.11
		Chicolna-Bogmalo	3,119	1.61	0.88	0.69	0.03
		Velsao-Pale-Issorcim	4,718	1.74	0.96	0.75	0.03
		Cansaulim-Arossim-Cuelim	5,959	3.3	1.81	1.42	0.07
		Majorda-Utorda-Calata	6,828	5.47	3.01	2.35	0.11
		Nagoa	4,231	1.57	0.86	0.67	0.03
		Mormugao (M CI)	1,03,200	45.42	24.98	19.53	0.91
Mormugao		Verna	7,087	3.08	1.69	1.33	0.06
		<b>Total</b>	<b>1,88,291</b>	<b>81.08</b>	<b>44.59</b>	<b>34.86</b>	<b>1.62</b>
Salcete	C4 b	Nuvenm	10,012	3.84	2.11	1.65	0.08
		Raia	11,675	4.35	2.4	1.87	0.09
		Curtorim	14,047	4.64	2.55	1.99	0.09
		Sao-Jose-de-areal	11,307	3.52	1.93	1.51	0.07
		Davorlim-Dicarpale	21,173	10.47	5.76	4.5	0.21
		Aquem-Baixo	7,398	2.77	1.52	1.19	0.06
		Navelim (Salcete)	13,518	5.16	2.84	2.22	0.1
		Cana Benaullim	13,471	6.2	3.41	2.67	0.12
		Betalbatim	3,981	2.37	1.3	1.02	0.05
		Camurlim	2,500	0.96	0.53	0.41	0.02
		Chandor-Cavorim	3,082	1.34	0.74	0.58	0.03

Taluka included	Group	Clusterwise VP/MC /CC included	Population (2018)	Waste Generation TPD (2018)			
				Total	Biodegradable	Non-Biodegradable	Domestic Hazardous
		Colva	7,491	5.86	3.22	2.52	0.12
		Guirdolim	3,898	1.85	1.02	0.79	0.04
		Loutulim	6,374	2.35	1.29	1.01	0.05
		Macasana	2,012	0.71	0.39	0.31	0.01
		Rachol	1,789	0.52	0.28	0.22	0.01
		Seraulim	4,502	1.74	0.96	0.75	0.03
		Talaulim	3,156	0.89	0.49	0.38	0.02
		Rumdamol	5,863	1.26	0.69	0.54	0.03
		Margao (M CI)	95,699	61.05	33.58	26.25	1.22
		Varca	5,847	3.02	1.66	1.3	0.06
		Chinchinim-Deussua	8,813	3.7	2.03	1.59	0.07
		Ambelim	2,942	1.01	0.56	0.44	0.02
		Assolna	3,420	1.68	0.93	0.72	0.03
		Carmona	4,096	1.08	0.6	0.47	0.02
		Cavellossim	2,033	2.56	1.41	1.1	0.05
		Dramapur-Sirlim	4,708	1.65	0.91	0.71	0.03
		Orlim	2,138	0.7	0.39	0.3	0.01
		Paroda	3,664	1.19	0.65	0.51	0.02
		Sarzora	2,374	0.46	0.25	0.2	0.01
		Velim	6,113	2.37	1.3	1.02	0.05
		Cuncolim (M CI)	7,373	7.61	4.18	3.27	0.15
		<b>Total</b>	<b>63,520</b>	<b>149</b>	<b>82</b>	<b>64</b>	<b>3</b>
Salcete, Mormugao		Vernam Cluster Total	2,51,811	230	126	99	5

Table 6: Verna Cluster waste generation numbers

## Appendix B – Suggested Means for Collection, Transportation, Processing & Disposal of Solid Waste

### 1. Process of Collection from Households

The primary collection from households is done in two cycles – wet cycle and dry cycle. While waste generators shall be encouraged to undertake composting of wet waste within their premises, in case of collection by the local body, waste shall be properly segregated. In case of poor connectivity, wheelies, hand carts or any other means may be deployed for collection from interior areas. Collection of sanitary and domestic hazardous waste shall be undertaken along with the most frequently collected waste stream. In case of daily collection of both wet and dry streams, it shall be clubbed with the dry stream. The detailed process is as described below.

**Table 7: Process of Collection of Waste from Households**  
**Generator - Households**

	Wet Waste	Sanitary waste	Dry Waste	Domestic Hazardous Waste
<b>Collection Cycle</b>	Wet Cycle		Dry Cycle	
<b>Vehicle type</b>	Auto tipper		Luggage autos (LCV's)	
<b>Receptacle</b>	bin	Separately labelled bag	bin/bag	Separately labelled/ bin/bag
<b>Drop off location</b>	Composting or Biomethanation facility of the local body/ CLIF	Designated storage area at the MRF/CLIF	MRF/CLIF	Designated storage area at the MRF/CLIF

### 2. Process of Collection from Commercial and Institutional Establishments

The primary collection from commercial and institutional establishments is also done in two cycles – wet cycle and dry cycle. Each establishment shall collect and store segregated waste generated at various points within the premises at an easily accessible common area from where it shall be picked up by the local body. The process of sanitary and domestic hazardous waste collection shall be similar to that of households. The detailed process is as described below.

**Table 8: Process of Collection of Waste from Small Commercial and Institutional Establishments**

#### Generator–Commercial & Institutional Establishments

	Wet Waste	Sanitary waste	Dry Waste	Domestic Hazardous Waste
<b>Collection Cycle</b>	Wet Cycle		Dry Cycle	
<b>Vehicle type</b>	Auto tipper		Luggage autos	
<b>Receptacle</b>	wet waste bin/bag	Separately waste bin/bag	Dry waste bin/bag	DHW waste bin/bag
<b>Drop off location</b>	Composting station/ /Biomethanation Plant/CLIF	Designated storage at MRF/direct transfer to CBWTF	MRF/CLIF	Designated storage area at the MRF/directly to TSDF

### 3. Process of Collection from Beaches

The primary collection from beaches is done in two cycles – wet cycle and dry cycle. Various points along the beach, with appropriate accessibility, shall be identified as collection points.

Dry and wet waste generated along a stretch between two such collection points shall be stored at the collection points for pick-up by the collection agency. The detailed process is as described below.

**Table 9: Process of Collection of Waste from Beaches**

Generator - Beaches		
	Wet Waste	Dry Waste
Collection Cycle	Wet Cycle	Dry Cycle
Vehicle type	Auto Tipper	Luggage autos
Receptacle	Litter Bin/Bags	Litter bin/Bags
Drop off location	Composting Station / CLIF	MRF/ CLIF

#### 4. Process of Collection from Street Litter Bins

The primary collection from street litter bins is done in two cycles—wet cycle and dry cycle. These bins also include collections from hawkers and street vendors who shall be instructed to deposit their segregated waste into the nearest bin. Alternatively, municipal workers assigned predetermined areas/stretchers shall collect this waste and undertake basic segregation prior to pick up. The detailed process is as described below.

**Table 10: Process of Collection of Waste from Street litter bins**

Generator – Street Litter Bins		
	Wet Waste	Dry Waste
Collection Cycle	Wet Cycle	Dry Cycle
Vehicle type	Auto Tipper	Luggage autos
Receptacle	Litter Bin	Bin
Drop off location	MRF / CLIF	MRF/ CLIF

#### 5. Process of Collection from Bulk Generators

The bulk waste generators, as defined in the Model MSW Bye-Laws are those generating more than 25 kgs of waste per day and may include hotels, marriage halls, large apartment complexes, railway stations, bus stations etc. They may avail the service of the local body for a fee, as stipulated by the local body, but shall strive to manage their own wet and dry waste generated within their premises. The primary collection of waste from bulk generators, if done by the local body, is divided into two cycles—wet and dry.

**Table 11: Process of Collection of Waste from Bulk Generators**

Generator – Bulk Consumer				
	Wet Waste	Sanitary Waste	Dry Waste	Domestic Hazardous Waste
Collection Cycle	Wet Cycle		Dry Cycle	
Vehicle type	Compactor/Mini Compactor		Luggage autos	
Receptacle	Wet waste bin/bag	Sanitary waste bin/bag	Dry waste bin/bag	DHW waste bin/bag
Drop off location	Composting station/ /Biomethanation plant/CLIF	Designated storage at MRF/direct transfer to CBWTF	MRF / CLIF	Designated storage area at the MRF/ /directly to TSDF

#### 6. Process of Collection from Street Sweeping

The waste collected from street sweeping shall be collected by a mini compactor or auto tipper, depending upon the road accessibility and the capacity requirement. The streets will be swept and the collected waste shall be stored for pick-up at suitable points. The street to be swept in each village/town shall be identified by the local authorities. Based on the relative

composition of wet and dry waste in the sweepings, a decision on the most appropriate drop of point and disposal method may be determined. In case of relatively high leaf litter and inerts it may be dropped at a composting facility where recyclables and non-recyclables may be sorted prior to composting.

**Table 12: Process of Collection from Street Sweeping**

<b>Generator – Street Sweeping</b>	
Vehicle type	Mini Compactor/Auto Tipper
Receptacle	Jumbo bags kept at a distance of 1 Km
Drop off location	CLIF

### Summary of Collection and Transportation

The summary of the collection and transportation system for all the clusters in the State is in the table below. The collection schedule of the different generators shall be planned at the local body level.

**Table 13: Summary of Collection and Transportation plan**

Generator	Primary Collection Vehicle Type	Drop Location		
		Transfer Point	MRF/Composting Facility	CLIF
Wet Waste				
Households Commercial & Institutional Beaches  Street Litter Bins	Auto Tipper	Wheelies/hand carts or any other means may be used to transport waste from generators inaccessible to auto tippers to suitable transfer points. Storage bins of adequate size and capacity may be placed at these points	Auto tippers and/or RCV's collecting door-to-door waste (including from transfer points) shall transport waste to the composting facility of the local body	Auto tippers from local bodies located less than 10 kms and RCVs from MRF's drop waste at the CLIF
Bulk Generators Street Sweeping	Compactor/ Mini Compactor	-		
Sanitary waste				
Households Commercial & Institutional Beaches Street Litter Bins  Bulk Generators	Auto Tipper	Separate storage bins will be placed in the transfer points for storage of sanitary waste collected by door-to-door collectors  In-situ processing/ direct disposal through the regional facility	Sanitary waste collected (either with the wet or dry stream based on frequency) shall be transported to the MRF of the local body in Auto Tippers/LCV's	Auto tippers/ luggage autos from local bodies located less than 10 kms to drop this waste at the CLIF
Street Sweeping	Compactor /Mini Compactor		Adequate storage shall be provided by the local body to enable a secondary vehicle to carry the sanitary waste to the regional facility	
Dry waste				

Generator	Primary Collection Vehicle Type	Drop Location		
		Transfer Point	MRF/Composting Facility	CLIF
Households Commercial & Institutional Beaches Street Litter Bins Bulk Generators	Luggage autos	Wheelies/hand carts or any other means may be used to transport waste from generators inaccessible to LCV's to suitable transfer points. Storage bins of adequate size and capacity may be placed at these points	Luggage autos carrying Dry Waste shall drop the waste at the MRF set up by the local body	Luggage autos from VPs located in less than 10 km, RCVs from MRFs shall drop waste at the CLIF
Street Sweeping	Compactor/ /Mini Compactor			

### Processing and Disposal of Solid Waste in Goa

The segregated waste from all the generators is collected in five streams—Wet, Dry recyclable, Dry Non-recyclable, Sanitary and Domestic Hazardous wastes. These will be processed stream-wise in order to achieve maximum resource recovery and have the least carbon footprint/environmental impact. In addition, bulk C&D waste and garden & horticulture trimmings shall also be stored separately, when generated. As described in the Guiding Principles for waste management (Section 4.3), processing and disposal will be carried out at four different levels—

- » Generator level—Carried out by households and bulk generators within their premises
- » Ward/Village panchayat level
- » City and Cluster level
- » Regional level

The level at which the processing of the waste is done will be determined by the physiography, land availability and the waste generation quantum of the local body. In the areas where there is an undulating terrain and there is low waste generation, it may be difficult and financially unviable for the vehicles to carry out the door to door collection or to even set up MRFs. Processing at household level or at the village level for organic waste shall be proposed for such areas, where as the dry waste shall be collected at lesser frequency to improve financial viability. The streamwise processing strategy at different levels is described below.

**Table 14: Stream wise Processing and Disposal Strategy - 1**

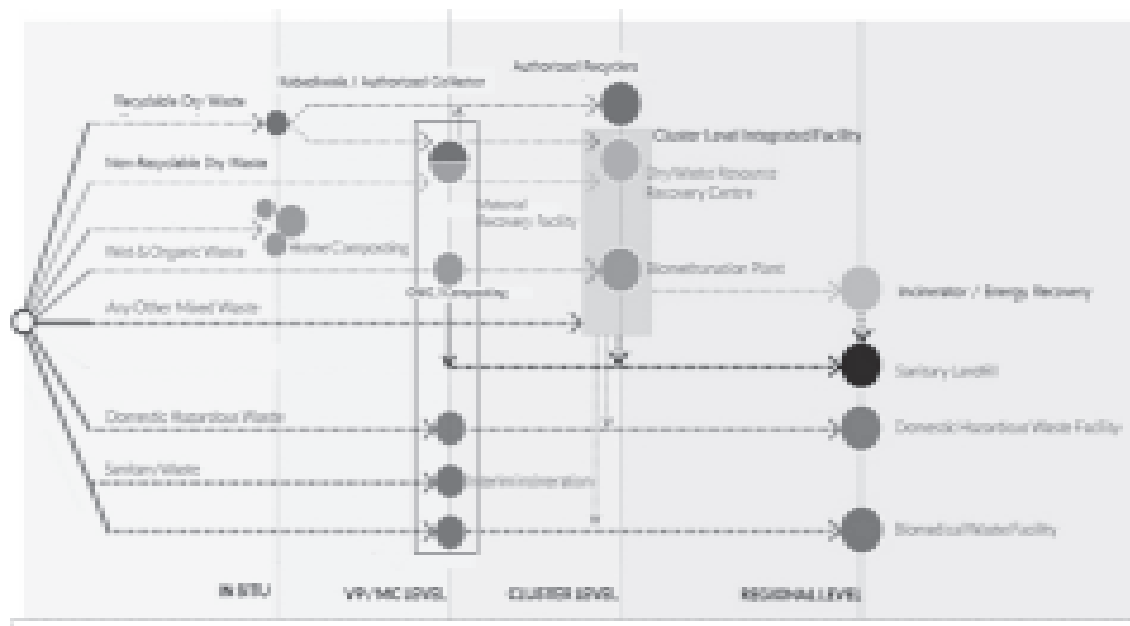
Wet Waste	Composting <ul style="list-style-type: none"> <li>• Households (home composting)</li> <li>• Windrow/drum composting, vermicomposting, Organic Waste Converters at VP level</li> <li>• Bulk Generator level OWC's/vermicomposting/regular composting/small scale biogas generators</li> <li>• Biomethanation plants</li> </ul>
Dry Waste	Resource Recovery Centres (Material Recovery Centres/Sorting Stations at local bodies) and CLIF's Recycling units for various types of plastic
Sanitary Waste	Interim Arrangement-Mini Incinerators (approved by CPCB/GSPCB) Disposal at Regional Level Facility (CBWTF)
Domestic Hazardous Waste	Disposal at Regional Level Facility (TSDF)

After recovering the resources (if any) from the above processes, the remaining waste shall be disposed in the following way.

**Table 15: Streamwise Processing and Disposal Strategy - 2**

Inert	Engineered Sanitary Landfills
Low Value	Baling of RDF and Co-processing at cement plants/waste to energy facilities
Recyclables/ /Non Recyclables	

**15: Processing and Disposal Strategy for MSW**



**Appendix C –Bins and Vehicles used for SWM (Indicative)**

**Street Litter Bin and Beach Bin**

It is proposed to install litter bins/waste receptacles for receiving wet and dry waste, along streets in all commercial areas and in places with high floating population such as beaches. The respective local body is free to select litter bins, however, the bins shall comply with the following specifications and requirements. The street litter bins shall be;

1. Simple, sleek in design, easy to use, easy to empty and to clean
2. Made of High Density Polyethylene (HDPE) (since the environment is corrosive)/any other durable material which is low on maintenance and vandal-proof.
3. With a lid to protect from rain and animals/birds, however, should have an aperture for throwing in litter

A set of two bins shall be placed at a distance of not more than 100 m distance from each other, depending on the pedestrian traffic volume and width of footpath available in case of street bins and tourist footfall in case of beach bins. While the regular street litter bins may have a capacity of 80 litres each, where the pedestrian volume is high, bigger bins of 140L/240L capacity can be installed. The beach litter bins shall be larger, around 240 L each.

All the bins should have an ID number, name of the street where it is placed and the name of the VP/ULB where it is located. It shall be color-coded and shall have graphic indicating 'wet' and 'dry' waste.



Table 16: Street Litter Bins



This bin is suitable for commercial streets with high floating population within the city, where the location of the bins can be fixed.



This bin is suitable for commercial streets / beaches with high floating population within the city, where the location of the bins can not be fixed.



The street litter bins fixed in specific locations can be provided with advertising spaces in selected areas, which can also be used for IEC activities.



Bins with innovative designs can be used in schools, areas of tourist importance like churches, forts and museums, parks, galleries etc.



This bin is suitable for locations where a large volume of material is collected and there is a desire to reduce the frequency of emptying. The bin is equipped with a solar-powered compression unit, which compresses the material collected in the inner container.

**Bins for Special Occasions**

1. Bins for special occasions/events where large crowd gatherings are expected shall be specially installed during the said occasions.
2. Wheeled bins of capacity more than 300 L capacity shall be used for this purpose.



**Figure 16: Litter Bins**

**Auto tippers**

1. Auto tippers for primary collection of wet waste shall be of capacity 0.6 tonnes to 2 tonnes, depending upon the generation at the local body and the road widths available.
2. The auto tippers should be mechanically tipped into the secondary vehicles at the transfer point platforms and transfer stations.
3. The vehicles should have a leak-proof MS load body with drainage tube and plug.
4. The selected vehicles should comply with the BS-VI emission standards, should be fuel efficient and low on maintenance requirements



**Figure 17: Auto Tippers**

### Mini trucks (LCVs)

1. Mini-trucks (LCVs) which are covered on the top for primary collection of dry waste shall be of a minimum capacity of 1 tonne, depending upon the generation at the local body and the road widths available.
2. The selected vehicles should comply with the BS-VI emission standards, should be fuel efficient and low on maintenance requirements



**Figure 18: Mini Trucks (LCV)**

### Refuse Compactor Vehicles (RCVs)

1. The RCVs shall be used for secondary transportation of waste from a transfer point platform, where the waste collected from an auto tipper is mechanically tipped into the RCV.
2. The RCVs shall have an in-built leachate collection system.



**Figure 19: Refuse Compactor Vehicles (RCVs)**

### Capsule truck with a hook loader

1. The truck with a hook loader has a hydraulically operated lifting device, used for loading of the container on to the truck. On the unloading point either the container can be rolled down to the ground or the materials inside the container can be disposed off through tipping operation.
2. These trucks shall be used to carry waste from transfer stations where the waste collected by auto tippers and luggage autos is compacted by static compactors.
3. The minimum capacity of the container/capsule carrying the waste shall be 10 tonnes.



**Figure 20: Capsule Truck with a Hook Loader**

## Appendix D – SWM Strategy & Timelines

Targets on Waste Minimisation		Short Term Goals						Medium Term Goals					Long Term Goals				
		2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032					
1	Ban on use of plastic items as per Rule 4 of PWM (Amended) Rules, 2021: Single use plastic cutlery, straws, flex, thermocol/styrofoam, decorative items, plastic films and carry bags of < 75 microns 25% reduction of the following 1. Drinking water bottles of < 500 ml 2. Reduction of plastics in medicine (tablet) packaging 3. Reduction in use of sachets for household consumer products such as sauces, shampoos, jams etc. 4. Reduction in toothbrushes and disposable razors																
2																	
3	1. 100% reduction in use and throw pens 2. Use of 25% recyclable plastic in all plastic packaging and carry																
4	25% reduction of 1. Reduction in the use of milk pouches 2. Reduction in use of tetra pak of < 1000 ML																
5	60% reduction of 1. Drinking water bottles of < 500 ml 2. Reduction of plastics in medicine (tablet) packaging 3. Reduction in use of sachets for household consumer products such as sauces, shampoos, jams etc. 4. Reduction in toothbrushes and disposable razors																
6	50% 1. Reduction in take-away food packaging plastic 2. Use of recyclable plastic in all plastic packaging and carry bags																
7	60% reduction in 1. Use of milk pouches 2. Use of tetra pak of < 1000 ML																



2866

	Targets for setting up waste sorting and treatment infrastructure	Short Term Goals						Medium Term Goals					Long Term Goals				
		2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2031	2032	2033	2034	2035
1	1. Saligao and Cacora plants to be fully operational 2. All MRFs to separate waste into at least 10 fractions																
2	1. At least 75% of VPs shall have their own functional MRFs 2. All Municipal councils shall have 5 TPD biometanation plants set up 3. Commencement of construction on Bainguinim and Verna CLIFs 4. 75% of dumpsite rehabilitation to be completed																
3	1. All MRFs to sort waste into at least 15 fractions 2. 100% VPs to have their own functional MRFs																
4	1. Completion of construction of Bainguinim and Verna CLIFs 2. 100% of dumpsite rehabilitation to be completed																
5	1. Commencement of operations at Bainguinim and Verna CLIFs 2. All MRFs to sort waste into at least 20 fractions																
6	50% of RDF from rehabilitated dumpsites to be sent for co-processing																
7	1. 100% of RDF from rehabilitated dumpsites to be sent for co-processing 2. All MRFs to sort waste into 25 fractions																



### Appendix E - Existing Legal Framework for SWM in Goa

Under the existing legal framework in the State, the Corporation of the City of Panaji is governed by **City of Panaji Corporation Act, 2002 ("PCA")** while the other categories of Local bodies in Goa—Municipal Councils and Village Panchayats, are governed by **Goa Municipalities Act, 1968 ("GMA")** and the Goa Panchayat Raj Act, 1994 (**GPRA**) respectively. The PCA includes specific provisions with respect to solid waste management which clearly spells out the functions of the Corporation towards provision of public receptacles, depots and places for the temporary deposit or final disposal of rubbish, offensive matter, sewage and carcasses of dead animals accumulating in the city and for taking necessary measures for the due collection and removal of such matter from any lands and buildings. The Act prohibits throwing or placing of any rubbish, offensive matter or sewage, on any street, or in any place not provided or appointed for the purpose by any person or from depositing any offensive matter or rubbish on the premises to be in an offensive state or injurious to health. However, such provisions are not included in the GMA or GPRA. The provisions in the GMA are only limited to providing penalty for the acts of nuisance like depositing of dust and non-removal of filth etc.

The **Goa Non-Biodegradable Garbage (Control) Act, 1996** is a specific law on garbage management in the State passed with the intent of preventing throwing or depositing of non-biodegradable garbage in public drains, roads and place open to public view. In addition

- » Under this enactment, the local authorities like Municipal Council and Panchayats are made responsible for placement of receptacles and providing places for deposit of non-biodegradable garbage.
- » The Act authorises the State to regulate the nature of packaging used by manufacturers, distributors etc. who produce or handle the commodities and to levy cess on non-biodegradable packaging material including bottles and containers.
- » The Goa Non-Biodegradable Garbage (Control) Rules, 1997 framed under the said Act provides for constitution of the Garbage/Waste Management Committee for efficient collection and disposal of the garbage in the garbage management zones identified by the local authority.
- » The committee is made responsible providing necessary assistance to local authority in selection of places for providing public receptacles for temporary deposit of garbage/ /waste generated in the garbage management zone and to arrange awareness programme to ensure reduction, re-use and recycling of garbage/waste.
- » It also levies duty on the owners and occupiers of the premises to provide separate receptacles or dustbin for collection of non-biodegradable waste and deposit it in public receptacles, deposits or places provided for such purpose by local authorities.
- » Failure on the part of the owner or occupier to abide by these duty attracts penalty equal to Rs. 200/- for first offence, Rs. 500/- for second offence and Rs. 5,000/- or imprisonment for subsequent offences and is almost equal to 10 times higher in case of commercial establishments.
- » It also enlists a range of studies, research or support programmes which may be undertaken and/or facilitated by the State Government.

The **Model Municipal Solid Waste (Management and Handling) Bye-Laws 2020** are to be followed by local bodies in order to manage MSW generated within their jurisdiction. These contain the following provisions

- » It prohibits littering and other nuisances in any public or private places and mandates waste collection vehicles to secure garbage and have leachate collection systems to avoid overflow or spillage.
- » It calls for segregation into 7 colour categories, as applicable, and lays out clear responsibilities of waste generators with respect to segregation, storage, delivery and collection of MSW.
- » It lays out the roles and responsibilities of local bodies viz-a-viz setting up of collection systems, provision of adequate infrastructure, manpower allocation, user charges etc.
- » It specifies requirements of waste transportation and recycling and composting options for MSW.
- » It finally imposes and specifies spot fines and penalties for various breaches of the Rules, including repeat offenders.

The **Model Municipal Plastic Waste Bye-Laws 2022** contains the following provisions

- » It mandates storage of plastic in a blue container, as specified in the MSW Bye-Laws of 2020.
- » Generators of plastic waste are required to either deposit such waste directly at the MRF or to local body approved waste collectors.
- » All waste pickers/collectors are required to be authorized by the local body and further required to file monthly returns of plastic waste collected and disposed.
- » It suggests disposal of non-recyclables through cement plants/waste-to-energy plants/road construction agencies and that of recyclables only through SPCB approved recyclers.
- » It mandates all brands, manufacturers, producers and importers to obtain consent from the GSPCB.
- » It seeks to develop means to register all waste pickers and provide them with ID cards.
- » The local bodies are required to undertake awareness on the various facets of waste management including segregation, improved consumer behaviour and use of alternatives either directly or through brands, producers or manufacturers of plastic.
- » Finally it lays out user charges and fines for those in contravention of the law.

The **Goa Waste (Scrap) Recycling Scheme 2010** which has the following objectives

- » To provide orderly establishment of waste recycling units in the State
- » To provide for trade zones to conduct business of buying selling and processing of recyclable waste
- » To identify and allot land for the units dealing with buying and selling of recyclable waste

This Scheme was formulated by the Directorate of Industries, Trade and Commerce on 16-04-2010 was twice extended till it expired in 28-04-2017. GWMC is currently in the process of formulating a new Scrap Yard Policy along the lines mentioned below

1. The revised/new policy shall take into account latest Rules and Bye-Laws to be complied with while setting up of such units

2. The ambit of scrap yard may be broadened based on functionality of the unit
3. The registration form and process shall be suitably streamlined for ease of implementation
4. Existing scrap yards put up by encroachment of low lying land or public land must be removed for being in breach of the TCP Law in force
5. Municipal bodies and panchayats must undertake a detailed survey of all scrap yards within their jurisdiction in order to determine legality of the same in coordination with the GSPCB
6. Detailed guidelines for the revised policy shall be provided by the GSPCB which may include but not restricted to the following
  - i. They shall comply with prevalent regulation, guidelines and bye-laws
  - ii. The scrap yards must all be fenced and have a concreted working area
  - iii. A proper access road shall be provided up to the entrance of the yard to allow for quick fire tender movement in case of emergencies
  - iv. Portable water provision as well as toilets with soak pit/septic tank for sewage shall be provided
  - v. Sufficient fire safety measures shall be implemented to safeguard human life and environment
  - vi. All workers employed at the yard shall be registered and provided with requisite PPE to ensure their health and safety
  - vii. Details of category-wise incoming and outgoing waste must be maintained and shared with implementing agencies as and when required
  - viii. Non-recyclable waste or RDF must be disposed only through GSPCB approved means such as waste to energy, co-processing at cement kilns or any other approved means

The Policy may include relocation of scrap yards which are set up in violation of existing laws or contrary to the guidelines laid out by the GSPCB. In such cases, the owner of the scrap yard will either have to acquire land on their own or the same may be made available by GIDC based on pre-determined terms and conditions, in order to carry on operations. Land availability being integral to such relocation and successful implementation of the Policy, it is prudent that while the GWMC undertake framing of the Policy with inputs from GSPCB, the responsibility of implementation should be of the Directorate of Industries, Trade & Commerce, under whose administrative control is GIDC.

Further strengthening the legal framework in the area of solid waste management, for the purpose of securing and assisting in the orderly establishment and development of facilities for scientific management of various waste including solid wastes, the Government has constituted a corporation viz. Goa Waste Management Corporation (GWMC) under **The Goa Waste Management Corporation Act in the year 2016**. GWMC is headed by Chief Minister of Goa and is entrusted with the functions such as framing policies, develop facilities for effective management of all wastes, manage existing facilities or the facilities in the process of establishment, develop areas for waste management, implement schemes for managing wastes at household, institution, corporate and local body level etc.

Apart from the above mentioned key institutional instrumentalities responsible for solid waste management of the State, many other bodies such as Directorate of Municipal Administration,

Department of Science, Technology and Environment, Goa State Infrastructure Development Corporation, Goa State Urban Development Agency & Tourism Department etc. contribute and support to the efforts of solid waste management in the State. The role of private sectors and NGOs are also significant in the management of solid waste in the State. Specific tasks such as primary collection, street sweeping, waste collection on highways, beaches and schools, operation and maintenance of processing plants and waste disposal in many of the local bodies are entrusted to private agencies and NGOs under suitable PPP framework or other mechanisms.

[www.goaprintingpress.gov.in](http://www.goaprintingpress.gov.in)

Printed and Published by the Director, Printing & Stationery,  
Government Printing Press,  
Mahatma Gandhi Road, Panaji-Goa 403 001.

**PRICE – Rs. 49.00**

PRINTED AT THE GOVERNMENT PRINTING PRESS, PANAJI-GOA—424/80—3/2024.